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STORAGE OF PETROLEUM.

MEETINGS OF THE COMMITTEE ON ORDINANCES OF THE BOARD OF ALDERMEN.

On the afternoon of Friday, November 14th, the Committee on Ordinances of the Board of Aldermen held an adjourned meeting at which the subject of an ordinance to regulate the storage of petroleum was further discussed.

Mr. Mitchell called attention to the provision of the drafted ordinance before them in respect to the safety of buildings near a petroleum refinery. The refining process in London, he remarked, was not permitted to be carried on within fifty feet of any other business. They proposed to abopt the same restriction here.

Mr. Heild representing an Insurance Company, read extracts of English laws respecting petroleum, for the information of the Committee. He desired also to impress upon them that it was not the oil that was occasioning alarm in regard to fire so much as the vapor that arises from it.

Mr. Mitchell said this was understood, but the difficult point upon which to harmonize opinion in the matter was, a safety standard of evaporation. In London it was fixed at 100 degrees, but here there was an atmospherical difference to be taken into consideration. He judged that, considered in this respect, they would be warranted in placing the standard at 110. (Nearly all the gentlemen present agreed to these figures.)

Ex-Judge Beebee appeared for the manufacturers and dealers. He represented that the insurance men, in their zeal to add to their own profits, were indifferent to the rights of the petroleum trade. He thought they should carry on as severe a crusade against camphene and alcohol, which were more dangerous than petroleum, and that 100 degrees was the proper standard of evaporation for the oil, for the public safety.

Mr. Douglas replied that the insurance men were prompted by good motives, and desired to protect life as well as to secure the safety of property. He could show by good chemical authority that oil vaporizing at 110 degrees was not safe.

Mr. Finch, a dealer in crude and manufacturer of refined oils, was familiar with the oil, having experimented with it since 1854, when the article was but little known. He made a thorough test of the different varieties two years ago, and found that they would vaproize at from 65 to 150 degrees. The difference in the amount of oil vaporizing at 110 and 140 degrees was six per cent., but the difference in briliancy was thirty per cent. Kentucky Legislature had fixed the vaporizing standard at 150, which, he thought, was too high. He believed 125 would be high enough, and 120 might prove safe. The best sample of petroleum he ever burned withstood flame up to 150 degrees. It would be impolitic to put a low standard into effect immediately, as it would make a large amount of stock unsalable. When the oil market was not excited the difference in the price of oil that vaporized at 100, and oil that vaporized at 130, would be about 60 cents per gallon. He was confident that 60 per cent. of the oil now in the city would not vaporize below 110 degrees.

Some desultory conversation on the subject ensued, and in a short time the committee announced an adjournment for one week. The interest in the subject, judging by the attendance, still increases.

FRIDAY, November 21.

At an adjourned meeting held this day at the City Hall, of the Committee of the Common Council having the petroleum oil matter before them, Alderman Mitchell being present, several experiments were made by three different instruments, all with a view to test the vaporizing point of petroleum oil. Results to this end were obtained from each of them. The committee having signified a wish to hear from the various parties interested in this matter, Mr. J. L. Douglass, Secretary of the Merchants' Insurance Co., presented a report of Prof. John Torrey, of the United States Assay Office, and also chemist of the Manhattan Gas Company, giving the result of his examination of sixteen samples of mineral oil submitted to him, said samples benig obtained from fifteen city dealers.

The experiments show the range to be from 80° to 124°. The Professor says, "I think it would be unsafe to store a mineral oil that gives off an explosive vapor at a temperature below 120° Fahrenheit."

W. D. McCreary, an oil dealer, called the attention of the Committee to the large interests at stake in this matter, and urged great caution in so shaping the ordinances as not to shut out by too stringent measures, an article entering so largely into the uses of the city and its outlets. He stated the arrivals by the Erie Railway for one year, from 1st Nov., 1861, to 31st Oct., 1862, to be 278,923 bbls., equal to 5,363 carloads and 11,155,920 gallons; in value, $2,510,302. This by one railway. Statistics by other channels he could not submit to-day.

Mr. J. L. Butler, on behalf of the oil interest, called the attention of the Committee to a report furnished by him, in April, 1862, to the Chamber of Commerce of this city, published in their annual report for 1862, showing that from Jan. 1 to April 2, 1861, the exports from New York city of this oil were 50,004 gallons. The first quarter of 1862, from New York, Philadelphia, and Boston, 2,398,506 gallons were exported; value, $946,678. At that period (April, 1862) he estimated that there was invested in the United States ten millions of dollars in producing petroleum oil.

He called attention to the growing importance of the trade, that it should be courted and not repelled, place no impediments in the way of so valuable an earth product reaching our city. Guard the rights of the city and its citizens. This can be done without throwing into other cities an article it is so important should reach our own. He considered that oil at 110° and upwards was perfectly safe.

D. C. Wheeler, Esq., stated his attention was called to this meeting, and as a citizen having its vast interests at heart, he desired to raise his voice in behalf of an article entering so largely into the wants of every household. Five years ago the name of petroleum was hardly known to the *few;* now all, even our children and servants, are familiar with its name and use.

Cotton has been said to be King; in his judgment the day was not far distant when the receipts of this oil in our city, would exceed that of cotton. It is making rapid strides in that direction.

Other cities are ready to avail themselves of any advantage let slip by this. Do not by any act touching this article, give them that apportunity.

This was understood to be the last meeting of the committee; it is possible another may occur before their report will be submitted.

GAS IN ASIATIC TURKEY.—The engineer of the Ottoman Gas Company has purchased a site for a gas-works in Smyrna, convenient to the sea and railway pier. What with railroads and gas-works and other innovations of civilized life, the Orient will soon lose its dreamy poetical character, and give place to the practical realities of this utilitarian age.

SIR HUMPHREY DAVY.

This eminent philosopher was the most agreeable to know on the terms of a slight acquaintance, says De Quincey, the opium-eater.

Their intimacy had not progressed beyond the barrier of strangership, the protection of which appears to have been reciprocally felt. He adds that he has reason to believe Sir Humphrey would have altered for the worse on a closer connection, his littlenesses, with which Henry Ward Beecher says all great men are fringed, being so conspicuous.

Sir Humphrey was a little below the middle height, agreeable in his person, and amiable in the expression of his countenence. His dress was elaborately accurate and fashionable—no traces of soot or furnace *there;* for it was youthful and almost gay in its character.

His manner was captivating from its courtesy, animated, well-bred, graceful, and gracious.

De Quincey adds, from Sir Humphrey Davy's conversation, which he carefully turned aside from his professional knowledge, nothing of importance was to be collected; he did not mean that there should.

Coleridge, on the other hand, did not like the brilliant manipulator and lecturer. He thought him effeminate, and ridiculed his lecturing in white kid gloves, and adapting his experiments, at the Royal Institution, to the shallow and trivial taste of mere amateurs who happened to be in powerful stations. Still more, he complained of Davy's sycophancy and subserviency to the women of fashion and rank.

Coleridge asserts that Davy was much admired by various women of quality, and so enthusiastically by some, that they would exclaim audibly at the public lecture-room, "Oh, those eyes! those brilliant eyes!" and that the philosopher was weak enough to be pleased with this homage.

(A certain engineer friend of ours is said to be similarly afflicted by attacks from the gentler portion of our race.)

De Quincey intimates that these complaints of Coleridge, at what he called Davy's forgetting the dignity of science in society, and openly laying himself out to win favor or applause, were the result of Sir Humphrey's superior introduction into fashionable society to Coleridge's.

He adds, Davy was not a favorite with Coleridge, and yet Coleridge, who grasped the whole philosophy of chemistry perhaps better than any man except Schelling, admired him and praised him much, though he did not seem greatly to respect him. He complained once or twice that Davy had been deficient in proper attentions to him, and, besides charging him with a want of self-respect, added that of sensuality in eating.

Davy was then supposed to be making a fortune by some manufactory of gunpowder for chemical secrets communicated. Soon afterwards he married a widow with a very large income said to be £4,000 a year, was made a baronet, was crowned with the laureate of science, viz., the President's chair in the London Royal Society, withdrew from further lecturing in kid gloves of any color; drank moderately of the cup of human enjoyment; became the leader of a circle; sickened; travelled for health unavailingly; died; and left a name which, from the necessity of things, must grow fainter in its impression under each revolving sun, but which was at one time the most splendid and the most resounding which has arisen since the days of Newton. So says De Quincey.

REPORTS OF GAS-LIGHT COMPANIES.

PORTLAND, MAINE.

Annual Report of the Directors of the Portland Gas-Light Company to the Stockholders, July, 1862.

In making their annual report, the directors have, for the first time in the history of the company, to show a decrease in the quantity of gas consumed during the year, being about five per cent. less than for the preceding year. This result, it is believed, is to be attributed to causes affecting the general business of the community; and with the removal of them, and the return of prosperity to other branches, a corresponding increase may be expected in ours.

It was early anticipated that a more considerable diminution in the receipts of the year might take place, and every effort has accordingly been made to reduce the working expenses, and to husband the resources of the company; and the directors have the satisfaction to report that, after carrying the usual amount to depreciation and renewal, the net earnings of the year have enabled them to declare dividends amounting to seven and a half per cent.

The principal saving has been in the low rate of freights, making the cost of coal less than usual, notwithstanding some increase of duties. The directors took advantage of this to the extent of the capacity of the coal sheds; and the company have now on hand all the coal that will be wanted for use for a year to come

A considerable saving has also been made by the use of the new benches of clay retorts, which have worked very satisfactorily thus far; and there seems no reason to doubt they will prove to have the advantages claimed for them as mentioned in our last annual report. The exhauster, McKenzie's patent, which was purchased of Elliman Brothers, of New York, is undoubtedly an important improvement in connection with the clay retorts, if not indispensable. It is run night and day, without stopping, by a steam-engine, made by Winslow & Co., of this city; and the whole has worked very satisfactorily.

Fire hose has been purchased and placed where it can be readily attached to the steam-pump at the works, of sufficient length to reach all our buildings; and the pump has force enough to throw a ¾ inch stream upon any of them. The night and day gangs have both been practised in running out the hose and making the connections. The risk of fire is not very great, and the protection thus afforded is not complete, but it was thought worth while to obtain the hose, as we had the pumps, and the steam-power is always in readiness.

The quantity of main pipe laid during the year is 790 feet, making the whole length of our mains about seventeen miles and a half. The number of consumers on June 30th, of this year, was 1,794. Last year it was 1,815. The number of street lamps is 295—ten more than last year. The total receipts from sales for the year amount to $65,409 88, which includes a considerable amount for coal. The receipts last year amounted to $65,863 28.

A question has arisen with the city in regard to the price of gas for the streets and public buildings. It was originally fixed by agreement at three dollars per thousand for the street lamps, without any discount, and three dollars and fifty cents for the public buildings with 5 per cent. discount. The price to other consumers was fixed by the company at $3 50, with five per cent. discount for prompt payment. These prices continued until December, 1860, when the directors, after carefully considering the subject, were of one mind that there was no good reason why any such discrimination should be made in the price of gas; and they accordingly reduced the price to private consumers and to the city for the public buildings, to $3 per M, without discount,—being the same as before charged for the street lamps. The city paid their bill accordingly, and found no fault with this reduction. In 1861, the directors concluded, after a careful examination of the affairs of the company, to make a further reduction of 15 cents per M. for prompt payment, and the same discount was made to the city, in their bill for the six months ending June 30th, 1861, and again January 1st, 1862, making the price to them $2 85 per M, although they pay but once in six months, and then after the delay necessary to have the accounts regularly examined and passed upon. These reductions were made without any request from the city, and without any dissatisfaction as to the former price, that we were aware of. But in February last, a notice was received from the city that the reduced price was not satisfactory; and three referees have been appointed, under the charter, to fix the price, before whom the question is now pending. The referees are Oliver Gerrish, Nathaniel Deering, and Joseph C. Noyes.

No question is made that the price charged is a reasonable one for gas in this place, and of the quality made at our works; but the claim made on behalf of the city is, that they should be charged less than the price fixed for individual consumers, whatever that price may be. The grounds for this claim are—1st, that the price to the city had been less for the street lamps than to individuals, until December, 1860, and that such is the custom in many other places; 2d, that it ought to be less, both for the lamps and public buildings, because they consume so much gas, and because no meters are used for the street lamps.

The answer is, to the first ground, that the price was originally fixed by agreement with the city without any reference whatever to the price to be charged to individuals. The one depended, under the charter, on the consent of the city—the other was left to the discretion of the company, and had to be put high enough to make up for any want of profit on the quantity supplied to the street lamps. The mere fact that private consumers did, for some ten years, pay more for their gas, because the company had to sell to the city at a lower price, is not of itself believed to be a good reason for continuing the practice. Neither is the existence of a similar arrangement in other cities. The origin of the custom is the same in all places where it prevails. The gas companies cannot establish their works without the consent of the city authorities. And it has been a frequent practice that a company agrees to furnish gas for the public lamps at a low price, sometimes at less than the cost, on condition of having the exclusive right to supply the citizens; and out of the latter a profit is made upon the whole quantity of gas sold. This is neither more nor less than selling a monopoly, and a monopoly in an article in such common use, that it may be classed among the necessaries of life. There is a general complaint against this practice in England, and in this country, so far as it has been introduced; and we are informed that the custom is fast falling into disuse. It is part of a system of defraying public expense by the sale of exclusive privileges, which does not prevail in this country, and does not approve itself as either fair or profitable. This company have more than fulfilled their contract with the city, and are now striving to establish what they believe to be the true principle of equal price by a general reduction to what is admitted to be a fair price to all alike.

But the question is not, we apprehend, what has been done in the past, or in other places, but what is right to be done now and here; and that brings up the second ground of the claim urged on behalf of the city as a large consumer, and using few meters. It is true that the city is a large consumer, and that such are more profitable. If the gas we make were all sold to a few large consumers, in central locations, the price would be much less than it can be sold at to be distributed in small quantities through all the streets. But we have other customers using very nearly as much gas as the city, exclusive of the street lamps, and with a much less number of meters. If the price were on this account to be put down to the city, ought it not to be lessened also to other large consumers in proportion? But the price could not be lowered to this class of customers without increasing it to the smaller ones. The probable effect of such an increase to the letter would be that many of them would give up the use of gas, as too expensive, or from dissatisfation at the inequality in price. In that case the price must again be raised to the larger consumers, or the stockholders go without their dividends, so large a part of our extended works would be unproductive. For these and other reasons, it is believed that any attempt to discriminate in prices would make trouble without resulting in benefit to any party; and no good reason is perceived why an exception should be made in the case of the city.

As to the street lamps, it is a mere fiction to include these with the public buildings, and speak of the city as a single customer for the whole quantity of gas it pays for. These lamps are located from corner to corner over a very large part of the area of the city, requiring over seventeen miles of main to carry the gas to them. The mains have always been extended fifty feet for a lamp-post, at the expense of the company, the same as for a building, and sometimes farther where the public accommodation was thought to require it. Might not the large establishments in central locations with as much reason claim that they should not be compelled to contribute in the price they pay for gas, towards this great expense of distributing it to one-light consumers scattered over the whole town, as the street lanterns are?

It is true that no meters are used for the street lamps; but this is not from the choice of the company The directors have long been satisfied that much more gas passes through these lamps than is paid for, and that the loss to the company, from this, would more than pay for having meters. They can see no way to prevent such loss in future unless by measuring the gas in the usual mode; and the last municipal year, under a vote authorizing it, an offer was made to the city, that the company would place meters at the street lamps at their own expense, if the city would agree to pay for the gas according to the meter, like other consumers, instead of as now, by estimate. This offer was not accepted. We do not wish to question the right of the city to decline it, but we ask, ought they to claim a preference over other consumers, on account of the manner of our measuring gas to them, when they will not allow us to measure it to them in the same manner as to others?

The position of the city, as the principal stockholder in the company, does not strengthen its claim to any preference over the consumers of gas. The dividends on the shares owned by the city, added to the tax assessed on the property of the company, more than pay for the gas for the street lamps; so that the city can pay a fair price as well as others, and it is for the interest of the city that the value of the stock should be maintained. The directors are firmly of the opinion that the best way to do this is by charging one price alike to all, and by making that price as low as it can be afforded; and as, in carrying out these views, the price to the city was not increased, but has been twice lowered without their asking it, it was a matter of surprise and disappointment to the directors of the Gas Company that what they intended as a liberal measure towards all their customers, should be met by a claim to further preference on the part of the city. If that claim were allowed, it would make it difficult, as the times are, to get along without an increase of price to others; and would postpone any further reduction in price when our business improves.

In this connection, it may be well to remind the shareholders, that their investment is not of that sure character that would render a reduction in the price of gas prudent merely because the profits for the year may exceed the ordinary rate of interest. Making and selling gas is a business subject to many contingencies that may at any time reduce or take away the profits of the year. During the past year, our purchases, of all sorts, have been made to advantage. The extensive improvements adopted last year, have been completed without mistakes, and within the estimates, and have worked thus far successfully. No accidents have occurred; and all bad or doubtful debts for the year amount to less than $500. And thus, with diminished receipts, fair dividends have been earned on an increased capital. This may be also another year, but it is not prudent to rely upon it—and no reduction in price ought to be made without a reasonable certainty of its being permanent.

The report of the Treasurer will show more particularly the financial condition of the company.

By order of the Directors,

E. H. DAVIES, *President*,

THE AMERICAN GAS-LIGHT JOURNAL IN ENGLAND.—We have received orders from England during the last month for upwards of one hundred copies of this JOURNAL, independent of our old subscribers there.

Will not SOMEBODY in this country take the English *Gas Journal?* We will give a one dollar Treasury Note to every new subscriber who will order, through us, within the current year, that spirited champion of American gas-light companies.

PAPERS ON HYDRAULIC ENGINEERING.

By Samuel McElroy, C. E.

No. 3.—*Pumping Engines.*

[From the Journal of the Franklin Institute.]

(*Continued from page* 135.)

For the supply of a pressing human necessity, for agricultural uses and other conveniences, from the various sources furnished by nature simply, or by nature and art, the mechanical skill of mankind has been called into use, in hydraulic machinery, simple or complex, from the days of the Genesis.

The various devices for raising water from running streams, ponds, lakes, wells, or cisterns, which have been in common use, transmitted from one generation to another, and placed on record by faithful observers, are studies of no ordinary interest and value. The single and double buckets worked by a simple cord or by a pulley, by hand or by animals; the various forms of the wheel and axle, and windlass; the primitive well-swape, which, in the new world as in the old, yet lifts the "moss-covered bucket," dripping with benedictions to the way-worn and thirsty; the varieties of ancient noriæ; the chain-pumps after their kind; the wooden and metallic hand-pumps of numerous class:—these, with bellows pumps, persian-wheels, scoop-wheels, flash-wheels, rocking gutters, inclined screws, all the classes of centrifugal, rotary, and reciprocating pumps, *et id omne genus*, have well deserved the elaborate attention paid them, by the scholars of past ages and by those of the present in the field of modern and antiquarian research.

While the romance of life has had adequate development beside the crystal wells and bubbling fountains, as the sacred writing and literary productions in our libraries abundantly show, the scientific literature of the present and past also shows, and especially in foreign tongues, with what care the difficult study of hydraulic engineering has been pursued, from distant ages. In the Italian, German, and French schools, the writings and records of such men as Vitruvius, Archimedes, Michellotti, Venturoli, Fischer, Eytelwein, Belidor, Dubuat, De Prony, D'Aubuisson, and their numerous contemporaries illustrate a profound appreciation of this most important department of research, which also pervades the more modern school of science.

So far, then, as certain fundamental laws and doctrines in hydrodynamics have been discovered and defined, as linked with the principles of natural science, the student of the present day may well feel as if much had been accomplished for him in this laborious field, and may take it for granted, amid all the pretentional flashes of new theories, that nature cannot but vindicate herself; and these clearly defined mechanical principles, which have come down to us with the sanction of authoritative age, like the doctrines of an exalted religious faith, may properly be valued and accepted as safe and infallible guides, which have borne the test of continuous trial.

Ignorance, however, and perverseness, have the same effect in mechanical matters as in religious, and each generation attempts within its limited period of action, in some directions, to controvert the accumulated testimony of all its predecessors, in those cases where it is willful, or neglects this testimony in those cases where it is careless. Hence, the common exhibition of endless repetitions of fallible experiments, the constant re-invention of time-lost machines, the constant debates, *pro* and *con*, over long-established principles, and the lamentable hindrances to systematic progress, because age is denied its prerogative of experience, and skepticism stumbles over the fallacy of personal re-invention and re-research.

Beside the effect of this absence of mechanical faith, the rapid progress in perfection of machinery, and the demand for increase in mechanical power, has had a strong tendency to throw into the shade the doctrines as well as the machines of past days; and while we must claim the universality and infallibility of principle, the correct application of principles to the new motors of the age may admit considerable discussion, and open the way to considerable misapprehension.

And it is in this particular that the engineering student finds himself at a loss, in the applications of hydraulic motors to the prominent uses and wants of the present day, as distinguished from the more simple machines we have briefly noticed. To investigate the several classes of pumping engines, with their numerous subdivisions, now in use, for mining and water-works purposes, and to determine the most valuable, involves no little research.

While, then, it is plain that the records of the past are exceedingly valuable on the score of doctrinal science, and by this we understand a science built upon correct experiment and observation in connection with established general laws, it is much to be regretted that our records of actual results, as developments of doctrine, should be so meagre and imperfect. Too much of an engineer's life is spent in a round of experiments, probably made numberless times before, or being made by others, because no adequate records have been placed within his reach. The want of proper communications of this kind is severely felt, and a dignified profession falls short of the rank of a science, because it is oral and traditional, rather than liberal and established, from the neglect of its own members, who carry their acquirements into their individual graves, and are buried with a miserliness which robs the generation of their treasures. The growing disposition to more systematic publication is one of the good signs of the present day.

Another source of trouble arises from the fact, that too many of our book-makers, and particularly of the English school, are not engineers in practice, but mere collaborateurs, who get their information chiefly by asking questions—not being qualified to sift truth from error, who copy largely, and have no professional *esprit*. Of a large portion of the text-books, treatises, and other works extant, how many authors are there entitled to rank as civil engineers? Like the institutions in fashionable vogue, which assume to graduate boys under age with a professional title, they are but blind leaders of the blind. But evils of this class and several others arise from the neglect of thorough-bred civil engineers to form themselves in an institution of mutual alliance, which we need not pause here to advocate.

The most casual glance at the state of pumping engine practice, at present, illustrates the general need of a more definite and systematic method. Engines of the most varied form and motion are not only to be found in different localities, but may sometimes be noticed in the same engine-house. In the city of Philadelphia, which has three distinct steam pumping supplies, three varieties of engines are at work in one house, two in another, and on the opposite side of the river are two more, different in class from either. In every direction, this class of construction seems to be treated as a matter of experiment, and the most extravagant outlays are sometimes made, with disastrous results; while the general standard of performance is unsatisfactory. It is plain that there is much need of a better order of things in this direction, and that the laws which govern pumping results with unalterable force, deserve a closer study and a more intelligent adoption; and it is equally plain that the present neglect of correct engineering oversight in construction is a fault to be remedied.

It is with the hope, therefore, that a reference to certain leading principles germain to this subject, which have been illustrated and confirmed by years of experimental observation, may be of service, that these papers are written.

General Analysis.—The question which interests us here is not confined to capacity for pumping, although capacity is important in its place. In those excursions about the country, which are frequently seen, of commissioners who propose to decide questions of construction for themselves, while they frankly admit their ignorance of hydraulics, an engine at work is judged by its apparent power, its compactness of form, its paint and bright-work, and the energy of its advocates, and possibly its first cost. But the engineer understands, that while very rude and cheap engines may be forced up to a large delivery, or while engines may be tastefully decorated and finished, the true standard of judgment passes at once to those perfections in general design and separate detail, by which annual economy in service and durability may be best attained. It is a question of design, workmanship, and coal combustion, as well as of water delivery; a question of relative duty at the steam-piston, of losses by friction and otherwise, and of harmonious action with the column of water under motion.

These are not the standards by which pumping engines are often built; if they were, the curious multiplication of specimens around us would not exist. Other standards are admitted, and private interest, or political patronage, or culpable ignorance, or "much speaking," variously combined, influence boards of administration at the expense of their constituents. Instead of entrusting a matter of this kind to competent engineers, who will devise and adapt plans to the local requirements without sacrifice of principle, the pernicious practice is often adopted of advertising for plans, from which the board itself assumes the prerogative of judgment, however crude or contradictory the results. The adoption of an engine becomes a lobby matter; facts are falsified, reports and testimonies suppressed, and the result is necessarily injurious. It is mainly on this account that, however expensive our water-works machinery and engine-houses, and however well appointed, the standard of annual "duty" with us, falls far below that of the half-enclosed, massive, and rude engines of the coal-mines across the ocean; not from want of outlay, or defective strength and finish, but from want of judgment in design and adaptation, and from neglect of the lessons of experience.

A pumping engine is to be considered in three divisions, which correspond with the usual division of its engine-house into the pump-room, the engine-room, and the boiler-room. In this problem of engine construction and performance before us, the pumps and main, the engine, and the boilers, although working in direct combination, are to an important extent independent in action, developing special principles under distinct operation, which affect the total result. And these principles cannot be neglected or perverted without injurious influence of one part on the other. These divisions may be noticed in this order:

PUMPS AND MAINS.

In water-works and mining practice we find the class of suction and force lift-pumps in general use, with various modifications of arrangement, as to pistons, buckets, plungers, valves, and other parts, as we also find various forms of mains in use.

There is a class of auxiliary steam-pumps used for boiler-feed, fire-engines, building purposes, excavations under water, &c., where ease of transportation, cheapness, compactness, and other special qualities influence their adoption, and where durability, appearance, and economy of use, are less important than in larger engines. These need not be more particularly enumerated, since they are controlled by the same principles which govern the others, and are valuable for their special departments only. And our reference, under the present division, to the larger pumps, after a notice of the rotary class, will be directed to the general features of valves, suction, force lift, and mains.

Rotary Pumps.—The successive improvements which may be traced through the class of water-wheels as chief motors in transmitting power, in which the modern turbines are conspicuous, have also suggested a reverse action, by which the wheels and turbines are changed into pumps, of which many different patterns are now and have long been in use, operating as suction and force lift pumps.

The laws of maximum useful effect, which have been very fully and clearly demonstrated for water-wheels, as types, apply to their reversed patterns, as to the form and arrangement of the blades, experiment having demonstrated a large increase of the discharge with a change from ordinary radial to properly curved arms, without increase of power. The following abstract of an experiment by Col. Morin, made at the Great London Exhibition, illustrates this point:

Form.	Revolutions per minute.	Gals. raised per minute	Height raised.	Useful Effect.
Curved Vanes (Appold's)	792	1164	18 ft. 8 in.	.649
" " "	788	1236	19 4	.680
Inclined " (45°) . .	694	560	18	.394
" "	690	736	18	.484
Radial "	624	369	18	.282
" "	720	474	18	.343

With the best form of pump which can be devised, useful effect is controlled by velocity and lift, and the

value of this motor is confined to low lifts under excessive speeds. Experiments made on Appold's centrifugal pump show a progressive percentage of work done, under a lift of 5.5 feet, with a 12-inch pump, of 21.2 per cent. for 375 revolutions, 59.1 for 460, 71.9 for 495, an increase to 607 revolutions giving 69.2 per cent. To raise water 67.66 feet, requiring a speed of 1,322 revolutions; and within their special range of application, 70 per cent. useful effect is all that can be claimed for the best motors of this class.

The laws of form, however, have been much overlooked in those in ordinary use, radial blades being common in practice. For bailing large quantities of water from foundations in excavation, where the supply carries much sand and gravel, for wrecking pumps, and like uses, the facility with which dirt, gravel, grain, &c., are passed through these pumps is a strong point in their favor, while they have no claim to merit on the ground of economy in power.

About ten years ago, some of our scientific journals were agitated by a discussion of the merits of a new theory of centrifugal power, which proposed to regenerate the mechanical world, and overthrow the antiquated notion that a machine could not transmit more power than was imparted to it. It was claimed to be demonstrated at the end of much printing, and was admitted by some of our puzzled *savans*, that by certain mechanical adjustments an increase of velocity might generate a force of 173,824 foot-pounds from a power of 42,480, and twice the velocity would yield 695,296 foot-pounds for 84,960. But like all wonderful discoveries of the kind, which seem to lead a cometary life, it has vanished in silence from the horizon of mechanical science, to return no more, and to be numbered among the stame and cloud engines, caloric steamers, water gasometers, full steam cylinders, and other celebrities of the passing hour.

From the pertinacity with which some of our engine builders have urged the necessity of an equable motion in pumping, which we shall notice more particularly under another head, we have been somewhat surprised to see so much neglect shown to the rotary pump, which accomplishes their desideratum in the most perfect manner, and the fact of such neglect must be taken as a strong argument against the reliability and economy of this motor.

Pump Valves.—Among the more prominent kinds of foot and delivery valves used in pumping, are the "butterfly," "clack," and "double-beat" varieties. The first are made of leather or metal, generally the latter, opening with two wings, on either side of the bucket or plate to which they are attached. In heavy lifts, and in all cases where the water column is apt to be disturbed, they are objectionable from their manner of seating. In the Cornish mines, leather clacks, sometimes divided into separate openings, are considered in some respects preferable, on account of the effect of mineral water on cast iron valves, and a better cushion in seating; a valve of this kind in common use, is arranged so as to lift its hinges a short distance, giving a wider opening; but the double-beat valve has undoubtedly proved of great service in relieving the effect of concussion, and in reducing friction in mine work. This valve, which is so arranged with an upper and lower seat as to offer a minimum resistance to its lift, with a maximum outlet when unseated, is being generally adopted in water-works engines, and fulfils its purpose admirably. The Brooklyn engine is working two of 54 inches opening, and two of 36 inches, under a lift equivalent to about 170 feet, and an enormous water delivery. The smaller valves play on the pump rods, and have wood seats, vulcanized rubber seats, first used, being found unreliable; the buckets are packed with lignum-vitæ, which has several advantages over leather or metallic rings.

A valve has been introduced in the engine of the Hull water-works, England, which contains in 22 inches diameter, and in the form of a pyramid, 56 small circular cells, of about 2-inch opening, in each of which a gutta-percha ball is held, with a certain play. This arrangement aims at a free delivery, with light valves, which can be easily replaced. Various forms of gratings have been adopted, with small india-rubber flaps, but in cases of heavy work they are not found durable.

(*To be continued.*)

MANUFACTURE OF ALCOHOL FROM COAL-GAS.

On page 106 of this volume we published a paragraph relating to the manufacture of alcohol from coal-gas. In a recent number of the *Journal de l'Eclairage au Gaz* we find the following remarks on the process from the pen of M. Mallet:

Thénard said, in his "Treatise on Chemistry," in 1827—"It is certain that the greater portion of vegetable substances are composed only of hydrogen, carbon, and oxygen; but, nevertheless, we cannot form any of those substances from these elements. This powerlessness of chemistry has often rendered results doubtful in the eyes of persons unacquainted with science, although really profound thinkers. J. J. Rousseau, when following the course of chemistry with Rouelle, said that he would only believe in the analysis of flour when he saw chemists able to reproduce it. The great writer would, doubtless, in the present day, use different language." These reflections of Thénard's are very judicious. Rousseau would certainly have had his conviction disturbed if he had witnessed the beautiful experiments of Lavoisier and of Meunier in 1783 and 1785, as well as the more recent ones of Lefevre-Gineau, Fouceroy, Vauquelin, and Seguin, on the synthesis of water. The philosopher of Geneva would, most probably, have believed in chemical analysis after seeing 500 grammes of water produced by means of oxygen and hydrogen, in the proportions indicated by the analysis.

But, what would Rousseau, and even Thénard, have said, if they had been fortunate enough to see alcohol manufactured from these elements? This production is one of the wonders of the chemistry of the present day, which is not yet at the end of its marvellous developments. The attention of chemists and manufacturers has, therefore, been awakened during the last two months, because it is now proposed to transplant this industry from the laboratory into the manufactory.

Since the question of the artificial manufacture of alcohol has seriously occupied attention, it has been discovered that, as early as 1854, a M. Castex, of Puteaux, took out a patent for a means of obtaining alcohol from *the smoke of oil, fat, and of all other organic matter*. The following is an extract from the patent given in the "*Cosmos*":—"In burning these organic matters, the smoke which is liberated may be absorbed by concentrated sulphuric acid. This sulphuric acid mixed with water and distilled, produces alcohol. To facilitate the absorption of the smoke, it is caused to pass through a body impregnated with sulphuric acid, or through coke moistened with the acid. When the acid no longer absorbs smoke, the body impregnated with it may be washed for the purpose of extracting it; and this weakened acid gives alcohol on distillation. Before delivering the ordinary lighting gas for the purpose of being consumed, it may be treated by this method."

The specification of the patent is drawn up in such singular terms, that it is clear M. Castex's knowledge of chemistry is not very extensive. As to making use of lighting gas before its consumption for the production of alcohol, it is a perfect impossibility. The gas would no longer give any light; and we do not recommend gas companies to make any use of the idea broached by M. Castex, for the consumers would soon rise in arms against the application of such a process.

The patent was taken out by M. Castex on the 8th of December, 1854; and, on the 15th of January, 1855, —that is to say, little more than a month afterwards— M. Bertholet explained for the first time to the *Académie des Sciences* his mode of producing alcohol synthetically. The nearness of these two dates may give rise to some reflections, from which we abstain, because we have not now to examine the question of the validity of the patent. For the scientific world, M. Bertholet is the first author of the discovery; and the silence of M. Castex is a mode of acquiescence which has some importance.

Let us now speak of the experiments of our celebrated chemist. It is not with smoke that M. Bertho let produced alcohol, but from the bicarburetted hydrogen, or olefiant gas. He introduced into a flask 26 litres of this gas, a quantity of concentrated sulphuric acid, and 3 kilogrammes of mercury—the use of which in the operation is, we apprehend, for the purpose of minutely dividing the particles. He then agitated the whole together for a considerable length of time. After about 53,000 agitations, it was found that the whole of the gas had been absorbed by the acid, and that a real combination was formed, producing an acid to which the name of *sulphovinic* or *sulphoethylic* was given.

In treating this acid with water, a new reaction was produced. The bicarburetted hydrogen set at liberty combined in its nascent state with water, forming alcohol, leaving the sulphuric acid combined with the addition of a certain quantity of water—that is to say, diluted—and, according to the formula of equivalents, we have $C_4 H_4 + 2 H_1 O = C H_5 O_2$. The alcohol produced is expelled from the liquid by heat.

Up to the present time, M. Bertholet has made no attempt practically to utilize this curious experiment. Possibly, he was frightened by the difficulty which attended the absorption of carburetted hydrogen by even the most concentrated sulphuric acid; and he has contented himself with sending to the International Exhibition of London a litre of alcohol thus produced from its elements, which may be seen in the glass case of M. Ménier, No. 204 Class II. of the French department.

What M. Bertholet has not attempted, M. Cotelle, of St. Quentin, has since realized. Like M Castex, he has had the idea of employing coal-gas for the production of alcohol, but not before using it for the purpose of giving light. Coal-gas well purified contains light carburetted hydrogen, bicarburetted hydrogen, carbonic oxide, hydrogen, and certain carburets, more or less well determined—such, for example, as a trace of propylene, aniline, and even perhaps of acetylene. Of these various gases or vapors, the bicarburetted hydrogen is, with propylene, the sole useful element for the purpose proposed. Unfortunately, it exists only in very small proportions. The richness of coal-gas in bicarburetted hydrogen depends evidently, in the first instance, on the nature of the coal distilled, and afterwards upon the manner in which it is distilled. If certain old and not very numerous analyses are to be relied upon, the proportion of bicarburetted hydrogen may be from 8 to 12 per cent.; but under the conditions in which the manufacture now takes place, we consider these figures as much too high, and believe that 3 or 4 per cent. at the utmost would be much nearer the truth. We speak of the gas manufactured in retorts from the coals of Belgium and the north of France. As to the gas manufactured in coke-ovens, we do not believe it has yet been analyzed. However this may be, the following is the method which M. Cotelle appears to have adopted.

After having indicated in his patent many means which he has probably tried, he condenses the gas, and purifies it completely from its sulphuretted hydrogen and ammonia, and finally passes it through concentrated sulphuric acid, which dehydrates it as much as possible. By means of a pump or exhauster, the gas is directed to the base of an earthenware or glass column, filled with plates or diaphragms, pierced with small holes, upon which the sulphuric acid at 66° descends, and which is, consequently, minutely divided. The column which M. Cotelle used when we witnessed the operation, had only 14 plates or diaphragms, and a single passage of the acid did not suffice to absorb all the bicarburetted hydrogen of the gas, and, at the same time, to saturate all the acid. According to the inventor, a cascade of six plates would be required to accomplish these two objects at one operation—the absorption of all the bicarburetted hydrogen, and the saturation of the sulphuric acid.

Let us suppose this desideratum obtained. The carburetted hydrogen and the propylene are absorbed in the column, and there remains from 96 to 97 per cent. of light carburetted hydrogen, hydrogen, and oxide of carbon, without value for the purpose of giving light, but capable of being used for the purpose of heating. It is principally with the object of so using them that the pump or exhauster is required, so that the gas may be drawn off or propelled in any direction without increasing the pressure upon the retorts.

The sulpho-vinic, or sulpho-ethylic acid, which M. Cotelle calls his *vinasse*, is treated with five times its volume of water, and the mixture is then submitted to

the action of a current of steam, which carries with it the alcohol produced. These vapors are condensed, and the alcoholic liquor is obtained. This is distilled on a little lime to saturate the sulphuric acid which has been carried with it, and the products of this distillation are rectified, and alcohol of 90° is obtained.

The sulphuric acid which has been diluted by the operation so as to reduce it to 20° or 25° of strength, must be concentrated to 66° if required to be used over again, or some other use must be found for it in its diluted state. This use of it, advantageously if it is possible, involves the establishment of another factory on a large scale, even for a distiller producing 30 hectolitres (660 gallons) per day; for the quantity of sulphuric acid at 66° to be employed is considerable. It amounts to about 1,500 kilogrammes (30 cwt.) of acid for each hectolitre (22 gallons) of alcohol produced, or 45,000 gallons (45 tons) of acid for 30 hectolitres (660 gallons) of alcohol. Should it be desired to concentrate the diluted acid, apparatus must be provided, such as is used in the sulphuric acid factories. This truly is not a manufacturing impossibility: but what will be the cost of concentrating for 1,500 kilogrammes of acid—that is to say, for one hectolitre of alcohol?

This expense of concentration appears to us, in the actual state of chemical industry, to be a grave difficulty in the way of the success of the new process, even when the complete absorption of the bicarburetted hydrogen is easily effected, as well as the simultaneous saturation of the sulphuric acid, and we are quite sure that it would be necessary to make a new estimate of the cost price which the journals of St. Quentin with laudable zeal, but with too much precipitation, had fixed at 25 francs per hectolitre of alcohol of 90°. Any serious estimate of the cost price must have been premature, as M. Cotelle was not provided with suitable apparatus to determine it.

* Twenty-five francs per hectolitre for alcohol of good taste (it is said to be exempt from all empyreumatic flavor) the selling price of which was 70 francs! Here was enough to set all the speculators in a ferment, and to cause serious reflections to all distillers, and even the manufacturers of sugar and agriculturists. Purchasers presented themselves from all quarters, anxious to treat with M. Cotelle for his patents, French as well as foreign, on condition, be it well understood, that he satisfied them on the subject of cost price. The French patent was sold, it is said, for £20,000, and the English one for £480,000 A company was formed at St. Quentin, with a capital of £16,000, which was subscribed in an hour, for the purpose of constructing a real manufactory, and solving the problem on a manufacturing scale. Since then, that is to say, about two months ago, the enthusiasm has abated, the matter has been examined with more *sang froid*, and it is generally admitted that the cost price can only be ascertained as the result of a manufacture on a practical scale, and not by approximative experiments in the laboratory.

Some persons have not been sparing in their criticisms of the process, and even of the inventor, and have gone so far as to pretend that M. Cotelle had imposed upon the public; that he had never made alcohol from coal-gas, and that the brandy, which he had given his visitors to taste, was manufactured from molasses. Till, however, we have proof to the contrary, we cannot believe that M. Cotelle has lent himself to such charlatanism. For all actions there is logically a motive. What can have been the motive of this inventor? The illusion could not last long, and all his future prospects must be irreparably destroyed, should he have lent himself to any such fraud. M. Cotelle must, therefore, be regarded as acting in good faith, and even should it be proved that he has grossly deceived himself as to the cost price of his alcohol, or as to the possibility of introducing this system of manufacture, he is entitled to our praises for the trouble he has given himself, and for the sacrifices he has imposed upon himself and his copartners, if he has any. Pioneers often fail in their task, but they render incontestible services to society.

The following ideas, upon the most advantageous conditions in which the manufacture of alcohol can be effected, and upon the chances, more or less brilliant, which this new process has of success, may not be without interest.

Sulphuric acid, even concentrated to 66°, absorbs bicarburetted hydrogen with difficulty. This is indisputable; but in this process the gas is not used in a pure state, as in coal-gas (and even in gas produced from cannel, schist, and Boghead) it exists in a very small proportion, so that it is in a state of great subdivision, and, consequently, more easily subject to the action of the sulphuric acid. If the process is applicable, it is clear that gas will not be expressly manufactured for it even from cannel or from Boghead. In some manufactures, these gases are to be obtained as a species of waste product. Thus, in coke-ovens, immense quantities are suffered to be lost; and certainly the manufacturers of metallurgic coke will not hesitate to adopt such furnaces as will allow the gas and, at the same time, the other sub-products to be collected, if a market can be found for them even at a low price. There are some coals, such, for instance, as those of Commentry, certain varieties of St. Etienne, and of Mons, which may produce coke of a tolerably good quality, and a certain proportion of bicarburetted hydrogen. It is to such coals that a preference would be given. Generally, also, the manufacturers of oils of schist, who distil either Boghead or the schists of Autun, or of the Allier, derive little profit from the gas which they produce in spite of themselves, and this gas is much richer than the ordinary coal-gas in bicarburetted hydrogen. These are the sources to which, in our opinion, the manufacturers of alcohol by the new process should, in the first instance, look for their materials.

This use of gas, the refuse product of coke and schist oil manufactories, is all the more to be sought for as the quantity of coal to distil, with special reference to the manufacture of alcohol, may be very considerable. The cost of production published in the papers of St. Quentin indicates a consumption of two tons of coal for the manufacture of a hectolitre of alcohol; but, as we have before said, the quantity of coal to be employed depends evidently upon the richness of the gas given by it on distillation in bicarburetted hydrogen. If the gas contains 12 per cent. of bicarburetted hydrogen (we leave aside the propylene), two tons may suffice for the production of a hectolitre of alcohol at 90°, if the whole of the carburetted hydrogen is properly employed. We submit that 1,765 cubic feet of this gas are necessary for the production of this quantity of alcohol (M. Cotelle only reckons upon 353 cubic feet) Supposing the gas produced from coke-ovens at the rate of 7,063 cubic feet per ton of coal (and this product is the maximum, in the present state of such apparatus), the quantity of coal necessary for the production of a hectolitre of alcohol will be as given in the following table:

Richness of Gas in Carburetted Hydrogen.	Volume of Gas in Cubic feet.	Coal distilled, in Pounds.
12 per cent.	14,692	4,588
11 "	16,104	5,020
10 "	17,658	5,525
9 "	19,601	5,682
8 "	22,073	6,890
7 "	25,216	7,871
6 "	29,419	9,186
5 "	35,317	11,025
4 "	44,146	13,781
3 "	58,838	18,374
2 "	88,292	27,562
1 "	176,585	55,125

The quantity of coal being given by the formula $x \times 7{,}063 \times a = 50$, a representing the quantity of bicarburetted hydrogen contained in the gas.

The gas produced in schist-oil manufactories which distil Russel's Boghead No. 1, contains from 12 to 14 per cent. of bicarburetted hydrogen; and its richness should, therefore, be four times greater than that of the coal-gas manufactured in retorts.

The price of the raw material of the alcohol will depend, therefore, essentially on the price at which the manufacturers of coke will sell either the cubic mètre of gas or the cubic mètre of carburetted hydrogen; for they may easily sell only the part useful for the manufacture of alcohol—the surplus of the gas serving for the ordinary consumption of the ovens. These are our opinions upon the most advantageous manner of obtaining the raw material.

We will not return to the difficulty which the absorption of the bicarburetted hydrogen by sulphuric acid presents; but it may be useful to go further into the question of the expense of concentrating acid of 22° into acid of 66°. The large manufacturers of sulphuric acid admit that the concentration to 66° of the chamber acid, which weighs 52° or 53°, costs them at least a franc per 220 pounds of acid at 66°. To this expense it is necessary to add the cost of concentration from 22° to 52°. What will it be? As this operation is not carried on in ordinary manufactories of sulphuric acid, we can only give an approximate estimate; we, therefore, prefer to abstain. For a daily manufacture of 660 gallons of alcohol, 99,225 pounds of sulphuric acid of 66° are required. The concentration of this acid, diluted to 22°, with the loss consequent on it, would be an operation of extreme importance. Besides the cost of concentration, some account must be kept of the loss in acid caused by the distillation of the alcohol from the *vinasse* by means of steam, which necessarily carries with it a certain quantity of acid; and also causes some expense in the manipulation of this acid. Since M. Cotelle's experiments have been under consideration, we have always thought and still think that the question of the acid is one of the great difficulties, and perhaps the greatest, in the way of the successful realization of the new process.

Another consideration, but of another class, must not be omitted. The manufacture of alcohol with bicarburetted hydrogen gas, upon a certain scale, would necessarily be followed by a fall in the price of alcohol, and, consequently, a reduction in the price of molasses, which would lead to a diminution in the cost of manufacture. Besides this, well-informed persons pretend that the Champonnois system applied in farm-houses to the distillation of beet-root, and the utilization of the refuse on the spot, will allow alcohol of 90° to be produced at a cost of 1*s.* 8*d.* per gallon, profit included.

It will be seen that the question is complex, and it may be dangerous to form any positive opinion, at the present day, upon the new process. It is wise, therefore, to wait the practical experiments which the company Cotelle are about to make at the pit's mouth in the use of the gas from coke-ovens. Parties, interested will, nevertheless, do well not to fall asleep in their quietude. The alarm is given; numerous inventors are about to, or do already, occupy themselves with the question which will be closely examined under all its phases, and M. Cotelle should not be the last to seek actively to improve his process. The word "impossible" has long since ceased to exist in France in all that relates to industry, and the production of alcohol, by means of gas, may, one day or another, take its place among our manufacturing pursuits. This would be one of those wonders to which modern chemistry has accustomed us.

Gas in the West Indies.—The Burgher Council of St. Thomas, West Indies, is desirous of receiving tenders for lighting the streets of that town with gas. The tenders are to state the rate at which they will furnish the gas for 75, 100, 125, or 150 lamps, each to consume 6 cubic feet per hour; and the price per cubic foot at which they will furnish gas required for all other public lamps. The contractors are to furnish the lamps and other materials. The tenders are also to state the terms on which the works are to pass over into the hands of the public at the expiration of the contract, which is to last for either ten or fifteen years. The gas to be of the best quality (an ambiguous phrase). St. Thomas is a place of some 10,000 inhabitants, and is the centre of a large and flourishing trade. Tenders for the erection of gas-works will be received until January 1, 1863. Here is a chance for some of our enterprising Yankee gas engineers. This may be but the nucleus for other gas-works in the West Indies, and we commend the subject to enterprising men as well worthy of attention.

Soldiers' Prize and Bounty Money.—Soldiers serving on the Western gunboats are not entitled to prize money, nor are those infantry regiments who did temporary duty on board the *Cumberland* and *Congress* before their destruction by the *Merrimac*, entitled to the bounty granted by Congress to the crews of those vessels.

NEW RESEARCHES ON THE FORMATION OF HYDROCARBONS.

By M. Berthelot.

[From the *Comptes Rendus de l'Academie des Sciences.*]

In the researches which I have published during the last five years, I have established the synthetical formation from their elements, of the simple hydrocarbons and of the alcohols.

I have described sure methods of effecting these transformations. However, the simplicity of the results appearing to leave something to be desired, I have undertaken fresh researches, in order better to render evident the regular chain of transformation. Let me first recall to mind a few of the facts already established, so as to mark the progressive operations.

1. Carbon and oxygen unite to form oxide of carbon; hydrogen and oxygen unite to form water:

$$C_2 + O_2 = C_2O_2 \; ; \; H_2 + O_2 = H_2O_2.$$

2. Oxide of carbon and water unite to form formic acid:

$$C_2O_2 + H_2O_2 = C_2H_2O_4.$$

3. Formic acid (in the state of formiate of baryta) changes into marsh gas, water, and carbonic acid, according to a simple equation analogous to that by which acetic acid changes into acetone:

$$4C_2H_2O_4 = C_2H_4 + 2H_2O_2 + 3C_2O_4.$$

It is here that my new researches commence.

4. Pure marsh gas submitted to the action of heat, or, better, to the spark of a powerful induction-coil, undergoes a remarkable metamorphosis. Whilst a certain amount splits up into its elements, another very considerable portion condenses into a more complicated hydrocarbon acetylene:

$$2C_2H_4 = C_4H_2 + H_6.$$

Marsh Gas. Acetylene.

Nothing is easier than to obtain in this manner large quantities of acetylene in the state of purity by reproducing it from the cupreous acetylide formed from the crude product of the reaction.

To render these results more decisive in what relates to the formation of acetylene from its elements, I have reproduced it with marsh gas obtained from formic acid, that is to say, from water and oxide of carbon. This marsh gas, previously washed with bromine and potash, furnishes, indeed, acetylene, a result easy to foresee, but which I think it necessary to verify as a counterproof to my first experiments.

5. The acetylene thus obtained becomes a starting point for new formations. Indeed, I have previously shown that nothing is easier than to change it at the ordinary temperature into olefiant gas:

$$C_4H_2 + H_2 = C_4H_4.$$

Acetylene. Olefiant gas.

This is one of the neatest examples of the fixation of hydrogen in an organic substance. It is effected by attacking zinc by ammoniacal water in the presence of acetylide of copper. Here are some new details on the analysis of the products of this reaction. These products consist of hydrogen and olefiant gas, mixed with a little acetylene which has escaped metamorphosis. The method of analysis, which I am about to point out, is essentially qualitative. It admits of isolating in a manner each of the elements of a gaseous mixture; and the process is the more useful to be known, inasmuch as a similar analysis appears to have recently given rise to rather serious errors. The gaseous mixture is treated with ammoniacal protochloride of copper, which dissolves *simultaneously* the hydrocarbons $C_{2n}H_{2n-2}$, such as acetylene, and the hydrocarbons $C_{2n}H_{2n}$, such as olefiant gas; but the acetylene forms an insoluble combination, which is not destroyed by the ebullition of the liquid—a double property, which admits of its separation; whilst the olefiant gas simply enters into solution, and may be disengaged in the state of purity on boiling the liquid. It is thus obtained isolated, and may be washed with dilute sulphuric acid to free it from ammonical vapours, and then submitted to eudiometrical analysis.

6. Olefiant gas, C_4H_4, formed from acetylene, C_4H_2, may in its turn be surhydrogenized and transformed into acetene, C_4H_6:

$$C_4H_4 + H_2 = C_4H_6.$$

Olefiant gas. Acetene.

This is effected by a general method, which I published five years ago, and which has since received more than one application. It consists in fixing bromine on the first hydrocarbon, so as to form a bromide $C_4H_4Br_2$; then in replacing the bromine by hydrogen. This inverse substitution takes place very readily by the employment of iodide of potassium and water, without other agents.

I think it will be as well to mention here, that this fact, and the reduction of glycerine by iodide of phosphorus, constitute the first examples of the use of iodized compounds as reducing agents. We know how fruitful this method has become of late years. Among the other results that I have succeded in realizing, I will only mention one to conclude this account. It is,

The complete deoxidation of glycerine $C_6H_8O_6$

And its transformation into the carbide C_6H_6.

But let us return to the progressive construction of hydrocarbons.

7. Marsh gas, acting upon oxide of carbon, forms propylene, conformably to the following reaction, which I have already noticed:

$$2C_2H_4 + C_2O_2 = C_6H_6 + H_2O_2.$$

Marsh gas. Propylene.

8. The same marsh gas, sealed in a Bohemian glass tube, then heated to a temperature at which the glass begins to soften, gives rise to a small quantity of naphthaline. The greater portion resists. The formation of naphthaline from marsh gas may be represented by the following equation:

$$10C_2H_4 = C_{20}H_8 + H_{32}.$$

It recalls the formation of chloride, of Julin $C_{20}Cl_{10}$, from perchloride of carbon, C_2Cl_4.

To resume, we can form

From their elements, oxide of carbon and water;

From these latter formic acid;

From formic acid, marsh gas..... C_2H_4;
From marsh gas, acetylene..... C_4H_2;
And, consecutively, olefiant gas..... C_4H_4;
And acetene..... C_4H_6;
From marsh gas and oxide of carbon, propylene..... C_6H_6;
And finally, from marsh gas, naphthaline.. $C_{20}H_8$.

All these formations result from a regular series of simple reactions, exerted at first on the elements, then on the hydrocarbons. They establish the gradual and direct generation of hydrocarbons of more and more complexity from more simple carbides.

Parallel to this method, founded on the progressive condensation of the hydrocarburetted molecule, I may mention the method of simultaneous condensations, the applications of which I have otherwise developed. In the dry distillation of formiates, acetates, and analogous bodies, one and the same hydrocarbon molecule, C_2H_2, separates simultaneously in several different states of condensation; such as

Olefiant gas..... ... $(C_2H_2)^2$
Propylene..... $(C_2H_2)^3$
Butylene..... $(C_2H_2)^4$
Amylene..... $(C_2H_2)^5$

The constitution of the principal of these hydrocarbons has been verified by the formation of the corresponding alchohols.*

Such are at present the only methods established by experiment which allow of starting from their elements to arrive at carbides, at first simple, then more and more complex. Other analogous processes will undoubtedly be discovered, for such is the course of experimental science; but I think that the progress which may be made in this direction will be based upon the same general principles. Indeed, the two great paths of synthesis in organic chemistry are progressive condensation or simultaneous condensation, either at the expense of the elements of a single compound, or at the expense of the joint elements of two compounds. On these two principles depend all the general methods already found out experimentally, and of which more are being discovered every day. Now that synthesis has overcome the first and greatest obstacles—I mean those which hindered the formation of hydrocarbons and alcohols from their elements—the path widens as we advance; the compounds formed from these first terms become more numerous and undergo more varied and delicate metamorphoses. As is the case in other progressive sciences, the resources increase at each new step, whilst chemists become familliar with a series of problems of which they were hitherto almost entirely ignorant.

* It is also known to how many proofs the carbides, obtained in the dry distillation of the acids $C_{2n}H_{2n}O_4$, and analogous bodies, have been submitted by the experiments of MM. Reynolds, Hofmann, Cahours, Wurtz, &c. (The preparation of numerous chlo-

AMERICAN PETROLEUM.

In the departments of the International Exhibition devoted to the display of the produce of the United States of America and of Canada, respectively, there will be found a number of specimens of the native mineral oil or petroleum lately discovered in those regions. The cases in which this earth oil is placed contain, likewise, collections of the various liquids obtained from it by certain processes of manufacture. Altogether the contents of these cases possess a high degree of interest—first, by reason of the character of the material, and the remarkable circumstances under which it is found; and, secondly, because of the important bearing which the discovery of this substance might have upon established branches of industry.

Within the last ten years the attention of scientific men and manufacturers has been directed to the examination and production, on the large scale, of a class of combustible materials, of which the solid spermaceti-like substance, called paraffine, is one of the most interesting members, but which consists chiefly of liquids of greater or less specific gravity and varying volatility. All the members of this class of substances are what chemists call hydro-carbons, and the chemical composition of paraffine is the general type of their constitution. Paraffine possesses precisely the same composition as olefiant gas, which is one of the most illuminative of the constituents of coal gas, and, indeed, in a certain sense, it may be considered as olefiant gas in the solidified form.

All these remarkable and useful substances—that is, paraffine and the various liquids spoken of—may be obtained from the mineral oils or petroleum of Canada and the United States; and as the production of these commodities from other materials already constitutes an immense trade, it will be seen at once that the introduction of these new petroleums, in quantity altogether unexpected, and almost beyond belief, and the lowness of price consequent thereon, must be a serious and important subject for the consideration of those who are engaged in the manufacture of materials of a similar character.

When first the oil springs, as they are termed, were discovered, the oil was obtained near the surface, but after a time, as the surface supply seemed in some degree to fail, it was determined to sink wells to a considerable depth; in the expectation that larger and more regular quantities of the oil might be obtained. In many spots this was done, with the most astounding results; for, upon digging down from the surface twenty or thirty feet, a stratum of soft limestone was reached, through which the oil seemed to be percolating; it then began to rise rapidly in the wells, apparently upon the artesian principle; and in some instances such an enormous quantity of oil made its way to the surface, that it was found impossible to collect it; and it was necessary to cut a channel to the nearest stream, so that it might be carried off in the quickest and readiest manner. The stories that have been told concerning the quantity of oil produced by the wells, collectively, seem incredible; but it is stated authoritatively that the wells of Canada are yielding no less than 40,000 barrels, or 1,600,000 gallons of oil per day. What may be the effect of this supply, should it continue, upon the different branches of manufacture concerned in producing the materials of artificial light, it is impossible to say, but it is easy to perceive that such an influx of new material so far resembling the old as to be applicable in some respects to similar uses, must produce very striking and important changes.

The combustible liquids which are obtained by distilling these petroleums are employed for lighting purposes in the kind of lamps known as paraffine-oil lamps; and heretofore, that is, before the introduction of the American petroleum, oils similar in chemical composition, and suitable to similar purposes, were obtained by distilling either native mineral oil—such as the Rangoon earth oil, or solid mineral substances of the cannel coal class; such, for instance, as the

These substances yield by distillation products identical in their chemical character with the oils from the American petroleum. But there is a very important difference between them in one respect; although all the oils obtained from these different sources possess, as has been said, the same percentage respectively of carbon and hydrogen, it is probable that the mode of combination in each member of the series differs; the whole series being made up of a great number of members, which, although they have the same chemical percentage composition, differ from each other widely as to specific gravity, boiling point, and in the diffusiveness of their vapor. In the American oils, the members of the series having the lowest specific gravity and greatest volatility preponderate; in the oils obtained from the other sources mentioned above, the reverse is the case. The practical bearing of this state of things is, that oil obtained from the American petroleum is more inflammable itself, and not only so, but, from its superior volatility, the vapor diffuses into the atmosphere at a comparatively low temperature. This vapor is inflammable, and, like all vapors of the kind, forms, with oxygen, a mixture not only inflammable, but explosive; and so it comes that many of these volatile hydro-carbons are unquestionably so far dangerous as to require for their use and storage very considerably increased caution.

At the same time, the outcry which has been raised against the use of these oils is absurd in itself and obstructive to commercial enterprise. It is, doubtless, right in principle that substances of such a character should be kept under the supervision of the law, and that persons carrying on trade in them should be compelled to adopt the necessary precautions as to storage, &c., when danger exists; but there seems to be neither reason nor justice in such a course as that taken by the legislature at the close of last session of Parliament, when a bill was passed,* prohibiting any merchant or manufacturer from holding in stock more than forty gallons of petroleum, of any kind, without a license from certain authorized licensing bodies. There are petroleums which involve no more danger in their storage than sperm oil, which give off no inflammable vapor, excepting at a temperature closely approaching that of boiling water—as the Rangoon earth oil, for example. This substance, with the exception of the Boghead coal, forms the staple from which the illuminative oils and paraffine have been obtained. The rectified oils so obtained are exempt from the operation of the Act of Parliament, because they do not give off inflammable vapor under 100° Fahr.; but the raw material which does not give off inflammable vapor under from 205° to 210° Fahr., is brought under the vexatious operation of the Act simply because it is called petroleum, and without any consideration for its chemical and physical characters. By the words of this Act all the products of the distillations of the cannel coals—in every respect as dangerous in their nature as Rangoon petroleum—get off free. A score of substances, far more dangerous than either, are also left uncared for, and the Act becomes, therefore, partial in its operation, and mischievous from the restrictions which it places upon manufacturers where they are unnecessary, and altogether uncalled-for.—*Newton's London Journal of Arts.*

* An Act for the safe keeping of petroleum (29th July, 1862).

THE LATE STRIKE AT THE MANHATTAN GAS-WORKS.—The recent strike of the Irish laborers employed on the Manhattan Gas-Works, foot of Fourteenth street, East River, for higher wages, has resulted in their discharge, and the employment of Germans by the Gas Company. This enraged the strikers, and many of them have determined not to submit quietly, and on Saturday evening, November 15, a few of the disaffected men collected at the Gas-Works, evidently bent on mischief. Soon afterwards, as George Cline and James Egan were closing their work to go home, they were set upon and terribly beaten. Cline was struck on the brow with a hammer, and Egan had his skull fractured by a blow from a bar of iron in the hands of one of the rioters. Henry Morrow and Timothy Sullivan were arrested by the Eighteenth Ward police, charged with being the persons who inflicted the violence. They were taken before Justice Kelley, and committed to answer the charge of assault and battery and rioting.

PETROLEUM ITEMS

RISE IN PRICE OF CRUDE AND REFINED OILS.—An increase in the price of crude and refined oils, hitherto unprecedented, has taken place since our last notice of the trade. This sudden rise in prices has surprised many operators, and has interfered with contracts to an extent rather disagreeable to some parties, who never dreamed of such a rapid inflation. The Oil City *Register* of Nov. 6th has the following remarks on this subject:

"That our oil has an intrinsic value far above the present prices no one who has any knowledge of the subject will pretend to doubt, and if the consumption increases at the present rate, and the production decreases in like ratio, or even keeps at its present rate, why the inference is easily drawn. As to what the real intrinsic value of the article is, time and the daily discovery of new uses for it, will determine. But for the uses to which it is now applied, our producers do not think that the real value is less than $10 per barrel at wells. As to whether it will ever reach this price depends on the consumption and production.

"There have been some changes among the wells since our last. The Empire well, flowing about 400 barrels, stopped on Sunday morning last. To balance this the Phillips well is now flowing finely. The amount of daily flow of this well is variously estimated. Some rate it as high as one thousand barrels; some 700 and others 500 barrels daily. From the best information we can gather, we should estimate it at about 350 or 400 barrels. In this connection Mr. W. Phillips requests us to state to all those who have been in the habit of estimating the oil stored in tanks around his well, that said oil is not for sale, but will be required by the firm of which he is a member for their own use. So we suppose that buyers, in making their calculations of the amount of oil in tank on the creek, can just count this 20,000 barrels as not in market. The Woodford well, a few rods from the Phillips, on the Tarr farm, which we noticed as having ceased to flow last week, has commenced again, and is flowing some 350 to 400 barrels per day. The Pond Freshet, on Saturday, brought down about 9,000 barrels. The stock for sale now on the creek is light, and even on Saturday many boats failed to get a load. Our market closes firm and buoyant, with a further upward tendency. Prices of barrels $2.25@$2.50, according to quality, Ballard & Co's barrels bringing the highest figures. Freights to Pittsburg from $1 to $1.25. That portion of our oil fleet which started for Pittsburg last week and this, are all aground between this point and the mouth of Clarion. The Allegheny is falling fast, and it is raining as we go to press, Wednesday night. At Pittsburg crude is quoted at 16 to 18 cents."

A later number of the *Register* says:

"The market still continues brisk, and the demand active and increasing. A considerable amount of oil has changed hands during the past week at about the same figures quoted in our last report. There are a good many buyers in the market, and they seem anxious to buy. This, and the fact of the stock of crude in the hands of refiners in Pittsburg and the Eastern cities being well exhausted, has stiffened up the market. Producers are now asking $3 at the wells, but we have heard of no sales at the latter figure. Sales have been made during the week at $2, $2.25, and $2.50. We quote $2.50 to $3 at the wells, and $3@$3.50 at this point. The general impression here is, that oil will advance still higher when the river rises, as, on account of the great loss by evaporation, &c., buyers do not care to take large lots until they can move them with the least possible delay. There appears to be no immediate prospect for a freshet. There is about 12 inches of water in the channel here, and falling. The market closes firm and buoyant, with a strong upward tendency. Latest Pittsburg advices quote crude firm at 20 cents. Refined 47@50 cents. In the Eastern markets the prices further advanced in crude, and the latest New York advices quote crude at 29@30 cents; refined 50@62 cents.

"Prices of teaming 30 to 75 cents, according to distance, per barrel. Price of barrels $2@$2.75, according to quality. Freights to Pittsburg $1.75."

The Philadelphia *Public Ledger*, referring to this subject, gives the following as a partial explanation of the recent sudden rise in prices:

"The cause is scarcity, but a scarcity arising from suspension of the business of refining. In June the most of the refiners stopped work, under the fear that the Government tax would ruin the business. After three months of suspension, work was resumed by some of the refiners, but bad roads to the oil wells have made the getting out of crude oil a slow process. Meanwhile the stock in market has been greatly reduced by consumption and foreign shipments. Many of the most extensive refiners have orders on hand for all they can make in a month, and the prospect is, that high prices will rule for a few weeks to come. The foreign demand is very large, as in Europe the oil is used directly for manufacturing gas. Some of the richest and most expensive colors used for dyeing are obtained from the petroleum."

PETROLEUM TO BE EXPORTED FROM PORTLAND TO LIVERPOOL.—The Portland *Price Current* says that arrangements are being made to carry petroleum from the oil springs of Canada West, in iron tank cars, on the Grand Trunk Railway, and down to Portland. From that port it is to be shipped, during the coming winter, to Liverpool, where an immense fire-proof building is being erected at one of the docks in Liverpool, for the exclusive purpose of storing the petroleum as it arrives. The building is to be furnished with iron tanks capable of holding 320,500 gallons, and with room above the tanks for storing 140,000 in casks.

GENERAL WOOL AND THE THIRTY-SEVENTH N. Y. VOLUNTEERS.

The Thirty-seventh New York Regiment, upon leaving Baltimore, were honored with a review by Major-General Wool, in front of his headquarters, the Eutaw House, and the officers were invited by the General to his rooms, where he bade them farewell in the most affectionate manner. The following letter, expressive of the General's esteem, has just been received by Colonel Roome:

"HEADQUARTERS EIGHTH ARMY CORPS,
BALTIMORE, MD., Oct. 27, 1862.

"*Colonel Charles Roome, Thirty-seventh Regiment N. Y. State Militia.*

"My dear Sir,—The many important events which have transpired in this department during the past two months, and the consequent increased amount of duty devolving upon me, has so engrossed my attention, to the exclusion of all other matters, that I had almost forgotten the promise I gave you and your officers when you were on the point of leaving Baltimore, to state in writing my opinion of the Thirty-seventh Regiment New York National Guard State Militia.

"I now take sincere pleasure in stating that during the three months in which the regiment served under my command, not only my intercourse with yourself and your officers was of the most agreeable nature, but the bearing and conduct of the men was at all times such as to command my warmest admiration, while, at the same time, it assured me that if the regiment was required to take the field in defence of the Union cause, every man would be found able, ready, and willing to do his full duty.

"I shall always think with true gratification of our pleasant official and social relations, and I shall consider myself fortunate if I can always have under my command regiments of that class of officers and men of which the Thirty-seventh Regiment is composed.

"I remain, Colonel,
"Very truly your friend,
"JOHN E. WOOL,
"Major-General."

Col. Roome, our readers are aware, is the honored president of the Manhattan Gas-Light Company, of this city.

OPPRESSION OF SUBORDINATE OFFICERS.

Some of our newly-fledged volunteer colonels have been amusing themselves by playing the tyrant over their line officers, and in some cases to their own cost.

An adjutant of one of the New York regiments came home on sick leave, and being confined to his bed, was unable to return to duty at the time appointed. He forwarded a physician's certificate, however, and while convalescing, frequently saw his lieut.-colonel in this city.

On returning to camp he was placed in arrest and threatened with a court-martial, rather than submit to which he resigned, and received an honorable discharge. But when he presented his pay-roll for the period of his illness, he found the colonel had marked him "Absent without leave," and his pay, amounting to five hundred dollars, had been stopped.

In this emergency he applied to Mr. Murray for advice, who, having occasion to visit Washington soon after, stated the facts to the Adjutant-General, and obtained an order for the payment of his claim in full besides an expunging of the colonel's false return upon the regiment's rolls. A properly authenticated physician's certificate is equivalent to a leave.

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PROPRIETOR, JOHN B. MURRAY. | EDITOR, C. ELTON BUCK.

MONDAY, DECEMBER 1, 1862.

The often-repeated phrase—"All is quiet"—so frequently used in connection with the Army of the Potomac, may be accepted as significant of the present state of gas-matters. During the past fortnight we have heard of no new or stirring events, and nothing has occurred to disturb the regularity of the operations of our gas companies. We may, perhaps, except from the latter assertion the fact that the strike at the Manhattan Company's Fourteenth street station, mention of which was made in our last issue, has been summarily disposed of by the expulsion of the Irish laborers who fomented the disturbance, and the employment of Germans in their stead. All is now peaceful at the gas-works, and the new operatives will soon grow accustomed to their duties. The promptness and energy with which the officers of the company overruled the turbulent laborers who presumed to dictate terms to their employers, is worthy of all praise; for by their determination they probably prevented serious disturbances of the peace, which, had they been allowed to smoulder a little longer, might have burst into flames difficult to quench.

The Committee on Ordinances of the Board of Aldermen have continued their sessions since our last report, due notice of which will be found in another part of the JOURNAL. It will be seen that they have not as yet arrived at any conclusion in the premises; but from the opinions expressed at the last session of the committee, and the general tone of the remarks made by the members of the same, the inference is generally expressed that a high evaporating point will be fixed upon as the limit of safety. The point suggested by Dr. TORREY in his opinion on the subject, rendered to the insurance companies, is 120° F. The adoption of so high a point as this will exclude a large proportion of petroleum altogether from the New York market, and will seriously embarrass a number of those engaged in the trade; but if safety demands it, this fact should not for a moment stand in the way of the enforcement of an ordinance, even if entirely prohibitory of the article. As it is, a number of persons, including gentlemen well versed in the subject, declare this point as entirely too high; and they insist that a figure several degrees lower might be adopted with perfect safety. From the extended reputation of Dr. TORREY, and his well-known skill as a manipulator, and caution in expressing his professional opinions, great weight is to be attached to them; and as he has fortified this opinion with experiments on a large number of samples of both crude and refined oils, his judgment will be received by many as an indisputable evidence of the caution necessary to be used in all places where any quantity of petroleum is stored.

Fortunately for gas companies who use petroleum, an ordinance prescribing the figure advised by Dr. TORREY will not materially affect them: for the quality of oil best suited for carbonization is of a lower gravity, and less volatile nature than the bulk of the crude oils in the market. This variety likewise possesses the advantage of selling at a considerably lower price than the qualities ordinarily met with, being not so well suited for making kerosene oil, or the "light ends" which are now so much sought after in the manufacture of benzine and kindred fluids. It is the abundance of these volatile compounds which impart to crude petroleum its dangerous properties. The ease with which they ignite, and the tendency of their vapor to explode when mingled with atmospheric air, are well known. The heavier description of crude oil—containing but a small proportion of these subtle hydrocarbons—are much better fitted for conversion into permanent gases which are not so liable to suffer by condensation as those generated from the lighter varieties. The heavy oil possesses other recommendations also. It admits of a more careless handling, and does not lose so much by evaporation or leakage; consequently it recommends itself to those gas engineers disposed to try its merits by traits which stamp it as superior to other fluids of its class.

The recent sudden and remarkable rise in the price of crude petroleum has been the subject of much wonder not only to those engaged in the trade, but also to those entirely outside of its influences. Within a remarkably short space of time, prices suddenly advanced from 25 to 50 cents per gallon for the crude article, and 45 to 95 cents for the refined. Such a figure as this for refined oil is suggestive of the rates which ruled a few years ago, when kerosene oil was new to the public, and when it was distilled wholly from coal. Several reasons are assigned for this advance in prices. The increasing demand; the failure of a number of flowing wells; the difficulty of transportation and the scarcity of barrels, and, probably chief of all, speculation,—neither one of which, alone, would have caused a perceptible change in the market, but all operating together—have conspired to place a very different aspect upon the business from that which it wore but a month ago. Probably British political economists of the *Journal of Gas-Lighting* stripe, will attribute the rise to "depreciation of currency"—a tune which they are very fond of singing now-a-days.

This fluctuation in price in petroleum is a matter of no small importance to those gas companies who have either adopted it as a substitute for rosin or coal, or those who are contemplating such a change. The future price of the article is still an unsolved problem; and such being the case, no calculation can be made with certainty as to the economy of using the crude oil in place of other materials. A number of gas-works have been already constructed to make petroleum gas, and others are being altered to use the same raw material. The question of price, therefore, becomes one of some prominence to these companies, and the recent advance of one hundred per cent. has caused some apprehensions lest the price may go still higher, and like the cost of rosin, entirely exclude the article from the gas-works. Such apprehensions as these, however, we think are unfounded, and although prices can hardly be expected to ever fall to the low figure touched in June last, when 9 to 10½ cents per gallon was quoted as the ruling rate, the probability is that they must soon recede, but it is hardly possible that the exceedingly low prices of last summer will ever be reached again.

GAS AND GAS-MAKING.

The December number of *Harper's Magazine* contains an illustrated article entitled, "Gas and Gas-Making," in which an attempt is made to describe the process as conducted at the Manhattan Gas-Works. The artist of the Messrs. HARPER has been most unfortunate in his endeavor to delineate the interesting points of the manufacture. For instance, the cut entitled "Making Gas," although intended to show the interior of the retort house, gives a very poor picture of the reality, and even those familiar with such scenes must draw somewhat on their imagination to detect the resemblance of the misty looking objects on the right of the picture to the retorts and accompanying apparatus. A gross error is made in another place, where the representation of the interior of the purifying house is denominated "the retort house." In another place we are informed that burning fluid is made from coal tar!

The idea is a very good one for popular periodicals to describe the details of important manufactures; but when they attempt to do so they should see to it that the most minute accuracy be observed in every particular, otherwise more harm than good might be done, and wrong impressions be conveyed difficult to remove. In addition to this the story should be told in a plain, sensible manner, without any silly attempts at humor, or foolish lucubrations uttered by imaginary BIGGSES. To suppose that the reading public will not relish a description of an important art unless it be presented to them as a noisome dose whose flavor is concealed by a syrupy sickening taste, is an insult to popular intelligence; and the sooner the Messrs. HARPER understand this, the sooner will their *Magazine* be regarded by intellectual readers as it was a few years ago.

ANSWERS TO CORRESPONDENTS.

J. P. S., of N. Y.—*By writing to the parties most interested, you will, doubtless, obtain all the information you desire. We cannot undertake to interfere in the case, as it is contrary to our established rules. Our pleasant relations with both the litigants renders it a delicate subject for us even to allude to, and we hope you will not press the question.*

A. B. H., of Mass.—*As we do not make any professions of ability to foretell future events, we cannot give you the information you desire.*

G. P. S., of N. J.—*Hughes' work on gas has not been republished in this country. You can buy a copy of the English edition of Wiley or Appleton. It is about the best rudimentary work on the subject.*

C. B. E., of Pa.—*The paper was originally published in the* Journal fur Gasbeleuchtung *of Munich, and was translated for this* JOURNAL *in which it appeared Dec. 15, 1860. The views of the author have been questioned by several able gas chemists, although we are not aware of any formal criticism of them having been published.*

O. E. J., of Ohio.—*We believe the gas of the Manhattan Gaslight Company will average all the year round, at least 16 candles. It is superior to the Philadelphia gas, although the residents of the latter city will hardly admit this.*

P. E., of C. W.—*The last numbers have been sent and we hope they will reach you in safety. Let us know at once if any copies fail to reach you.*

J. H. T., of Ill.—*Although this estimate may have been within the mark a year or two ago, it will hardly be worth anything now. The prices of materials and labor have advanced so much in the interim, that a new calculation must be made.*

CORRESPONDENCE.

GWYNNE'S PATENT PROCESS FOR MAKING ILLUMINATING GAS.

WHITE PLAINS, NEW YORK, NOV. 25, 1862.

To the Editor of the AMERICAN GAS-LIGHT JOURNAL:

Through the medium of your JOURNAL, I desire to make some statements in reference to my patent processes for making illuminating gas, in which I flatter myself considerable interest is felt by many gas-engineers, on account of the cheapness which I guarantee my processes to possess. I have recently altered the gas-works at Woodstock, Vermont, and have the pleasure of stating that the company are satisfied with the operation of my process, as will be seen by reference to the letter of the president, Abraham Stearns, Esq.,

which I append to this letter. This satisfaction has assumed such a tangible form, that the price of gas in Woodstock has been reduced to three dollars per thousand, which will, no doubt, largely increase the consumption, and benefit the company in more ways than one. The quantity of gas made per hour from one retort is 400 feet. No petroleum whatever escapes decomposition. After the first hour nothing passes out of the condenser syphon. As to the economy of fuel (wood), I would state that the old retorts used a quarter of a cord per day, while the new ones, set according to my plan, consume only one eighth of a cord, or exactly one half the quantity formerly used. Three of the old retorts made but 300 feet of gas per hour, against 400 feet made by *one* of mine. The burn-ers in use in Woodstock are four-feet burners, and the gas is equal to sixteen standard candles in illuminating power. The following is the letter above alluded to:

"Woodstock, Vt., Nov. 21, 1862.

"Messrs. W. H. Gwynne & Co.:

"Gentlemen,—In regard to the success of the apparatus erected by you at our works, I would say, that, to present appearances, they will work successfully. We have produced 175 feet of gas per gallon from kerosene tar by your process, and have reduced the price of gas $3 per thousand feet. From all appearances you have erected the works in a substantial and workmanlike manner. We use less fuel than we did in our old works.

(Signed) "Abraham Stearns,
"President Woodstock Gas-Light Co."

The above letter speaks for itself. I am now prepared to undertake the alteration of any gas-works in the country, large or small, so as to make gas according to either of my patented processes, and to guarantee such inducements as regards economy of operation as will be tempting to any company making gas in the old way.

Yours respectfully,
W. H. Gwynne.

Philadelphia Water-Works—Turbine Wheels.—At the meeting of the City Councils of Philadelphia, held on the 16th ult., the Chief Engineer of the Water-Works, submitted a report in reference to the turbine wheels at Fairmount. It states that the new turbine wheels furnished by Emile Geyelin have been run at intervals since the month of June last, and that although some of the machinery does not yet work perfectly, the defects have not been greater than usual to new machinery of such magnitude. The gate of one turbine will not close sufficiently to entirely prevent the waste of water through the wheel. The gearing for raising the gates does does not yet work effectually, owing to the fact that the guides and working surfaces of the gate have become so much rusted by exposure as to increase the friction beyond the strength of the gearing. This will be remedied, either by increasing the strength of the gearing or by counterbalancing the gates. The main gearing works accurately and smoothly, but it has not been in operation a sufficient length of time to test whether the amount of surface presented by the teeth of the several wheels is adequate to the work to be performed.

In reference to the percentage duty the Chief Engineer says: "I am prepared to say, from the limited experience and tests of the pumping capacity of the work, I estimate the duty at somewhat over 70 per cent. This is not as great as the duty given by Mr. Geyelin's model, nor quite as much as that guaranteed in the contract; but I attribute this principally to the injudicious arrangement and limited size of the ascending mains and to the imperfections in the machinery before referred to. I am confident that, with a direct ascending main to the reservoir of an area equalizing and in proportion to the area of pumps, and after the machinery is fully completed and operated for a reasonable length of time, to make it perfectly free and smooth in all its parts, the wheels will give the full duty guaranteed in the contract."

Gas in Greece.—The ancient city of Athens has been lighted with gas. A French company had the enterprise to build the works and supply the gas. The first illumination occurred on the evening of October 1st, amid the rejoicings of the people. It is stated that other towns in Greece are likewise to be lighted with gas.

WATER AND GAS IN MINING.

SAFETY LAMPS.

Mr. Parkin Jeffcock, of Derby, England, thus speaks of the difficulties encountered in mining, resulting from gas and water:

Two of the greatest difficulties that have to be contended with in mining are water and gas. With regard to water, the mines in the South Yorkshire district are not in general heavily watered in comparison with other mining districts; the workings nearer the outcrops or "bassets" of the seams are generally more watered than the rest. Except in some special instances, there are few collieries where large pumping engines are required: lift-pumps are used exclusively, and even tubbing has scarcely ever been resorted to. A remarkable inundation occurred a year ago, at the Woolley Colliery at Darton, near Barnsley, which is working the Barnsley thick coal: the coal is drawn up a long inclined plane, extending from the outcrop of the Barnsley Thick seam, and following the dip of the seam; and the water is raised by means of flat pumps. On the 13th April, 1861, a sudden irruption of water into the workings took place to such an extent that they were almost entirely filled. The water entered through a fissure in the overlying rock, which is of considerable thickness, and is full of cracks and fissures towards its outcrop. It is probable that a large amount of head or drainage water had accumulated in these fissures while they remained closed, and that they afterwards became opened by subsidence of the strata, in consequence of the working of the coal: the water was found to be drawn away from a well in the rock at the surface 170 yards above the coal. The accumulation of water must have been very great, as it continued rising in the day drift a fortnight after the inundation had occurred, at the rate of more than one foot per hour, although a double 10-inch pump had been kept continuously at work; but its rise was subsequently stopped by additional pumping power.

In the amount of gas generated by the different seams of coal there are great variations. The most terrible explosions have taken place in the Barnsley Thick coal, especially at the Darley Main Colliery, the Oaks, Warren Vale, and Lundhill: the Barnsley Thick and Silkstone seams being specially liable to sudden and powerful emissions of gas. The ventilation is produced by a furnace at the bottom of the upcast shaft, by which a fresh current of air is kept continuously flowing through the mine, so that any gas issuing from the coal is speedily diluted and rendered harmless. For distributing the air through the workings, stoppings, doors, and regulators are arranged in proper places. The division of the air into separate "splits," each of which ventilates a distinct portion of the workings by means of the crossings or "overcasts," and "scale doors" or regulators, may be considered, if properly carried out, one of the best preventives of explosions in these very fiery South Yorkshire mines. All the return air should be conducted into the upcast shaft by a dumb drift, so as not to pass through the fire of the furnace; and the underground furnaces, whether closed or otherwise, should be fed with nothing but fresh air direct from the downcast shaft.

At some of the mines in the district, belonging to Earl Fitzwilliam, large fans, driven by steam power, have been substituted for the furnace generally used elsewhere; they are a simple and efficient means of mechanical ventilation, well worth the consideration of all interested in mining, and have now been continuously working with complete success for several years. In the early periods of mining, the only ventilation was natural ventilation, the current of air through the workings being produced simply by the colder and denser air from the downcast shaft displacing the hotter and rarer atmosphere of the mine. Sometimes rarefaction was increased by putting a pan of coals in the upcast shaft; but the consequence of imperfect ventilation was, that the workings were sometimes stopped for many days together. Natural ventilation could, of course, be adopted only when the shafts were of moderate depth and the workings on a limited scale.

The introduction of safety lamps into mines is of comparatively recent date. In the South Yorkshire district they were first used exclusively at the Oaks Colliery, in the workings of the Barnsley Thick coal where Stephenson lamps are used in preference to Davy's; and the use of safety lamps has since extended to many other collieries. At the Wharncliffe Silkstone Colliery, near Barnsley, working the Silkstone seam, Stephenson and Davy lamps are used exclusively; and as the coalfield is very much cut up here with faults, the gas cannot be "bled" away, but as each fault is cut through, the greatest caution is required in dealing with the gas in the solid coal beyond "in bye." In addition to the use of safety lamps, an abundance of air should be taken into the working places of fiery mines. Since the explosion at Lundhill, in 1857, safety lamps have been exclusively adopted there. The importance of their use in fiery workings was strongly shown at the Oaks Colliery in 1857, when an outburst of gas took place in the workings down the engine plane, so violent that it was compared to the roar of a draught in the furnace. All the Stephenson lamps were put out, and the Davy lamps were ignited internally, the gauze becoming red-hot. As the outbursts of gas occurred within a hundred yards of the main intake to the upcast shaft, and a large quantity of air was passing this part at the time, the gas was soon diluted and carried away; and in less than an hour the only traces that remained were found at one or two places where the floor had been upheaved. Thus, no doubt, a terrible explosion had been averted by the use of safety lamps; but if any one of the lamps had been out of order, or the gauze smeared with oil or coal dust, or if any naked light had been in this part of the workings, an explosion would inevitably have occurred.

WATER-WORKS OF AMERICA.

DANBURY, CONN.

The following interesting report relative to the Danbury Water-Works, and the amount of receipts and disbursements for the same during the past year, was presented by the Water Commissioners at a recent Borough meeting:

The Board of Water Commissioners have to report that, during the past year, the pipes, hydrants, and fixtures of your Water-Works have generally remained in good condition; the few repairs needed, having been made by the contractors at their own expense.

Although the season has been unusually dry, the supply of water has been abundant at all times, and large quantities have been permitted to run to waste during the greater part of the year.

The discoloration and impurity of the water during the hot months was much less than during the previous season—continuing only a few weeks—and we hope the vegetable matter still remaining in the reservoir, will be so far destroyed during the coming year, as that no further trouble will be experienced from it.

The only extension of the main pipe made since the last report, is a line of 1,236 feet of 4 inch, on Deer Hill Avenue, south from Wooster street.

The water is being gradually introduced into the dwellings and other buildings in the Borough, though not as rapidly as could be desired, nor as we trust will be the case, when our citizens more fully appreciate its convenience and advantages. As we all have a common interest in this valuable public improvement, we would again express the hope that each and every citizen will do what they can personally, to encourage the introduction and use of the water, and thus make the enterprise a self-sustaining one, at as early a day as practicable. We presume there are few cases where its introduction would not increase the value of property, either for sale or rent, far more than the expense attending it.

The total amount of 6 per cent. bonds, outstanding, is $37,500. About one-half the interest and expenses payable during the past year, has been collected from those using the water, and the balance by an assessment of hydrant rents on owners of combustible property. Aside from the bonded indebtedness, the amount of claims outstanding, on account of the construction of the Water-Works, will not exceed one hundred dollars.

Until a sufficient number of our citizens introduce the water into their premises, to pay the whole of the interest on the bonded debt,—which we hope will be the case in the course of a few years,—the deficiency

from year to year, must be paid in one of two ways—either by hydrant assessment, or from the Borough treasury. The first method was adopted by your Board, for the year 1861, and an assessment of about $1,100 was laid by them on property protected from fire by the hydrants. It will be necessary to make a similar assessment for the year 1862, unless the Borough should prefer to pay the whole, or a part of the amount from the Borough treasury. The Commissioners are desirous of complying with the wishes of the Borough in this respect, and will cheerfully be governed by any action which may be taken by this meeting in regard to the matter.

Appended hereto will be found a statement of receipts and disbursements during the past year, as required by the provisions of the Charter.

All of which is respectfully submitted.

JOHN W. BACON, CHARLES HULL, A. N. STEBBINS, } *Water Commissioners.*

Danbury, Nov. 17, 1862.

RECEIPTS.

Received from sale of Bonds	$8,002.58
Received from Hydrant assessments	1,079.72
Received from Water rents and for use of water	1,043.14
Cash on hand Nov. 1, 1861	290.01
	$10,415.45

DISBURSEMENTS ON CONSTRUCTION ACCT.

Paid Patent Water and Gas Pipe Co	$7,552.84
Paid amount voted three Water Commissioners	150.00
Paid amount voted J. W. Bacon, for engineering, &c.	200.00
Paid for trenching Deer Hill extension	112.50
Paid S. P. Ayer's bill—hydrants	59.00
Paid Chas. Hull's bill—sundries—in part	20.20
Paid D. & N. R. R. Co.'s bill—freight on pipe, &c.	31.64
Paid Treasurer and Clerk's bill—sundries	15.45
Paid for work on dam	33 88

DISBURSEMENTS ON EXPENSE ACCT.

Paid interest on Bonds, due 1st Jan. 1862	885.00
Paid interest on Bonds, due 1st July, 1862	1,095.00
Paid T. Mootry, Commission on collections	71.63
Paid expenses of watering Main street	94.49
Paid Chas. Hull's bill—sundries—in part	14 98
Paid repairs on dam	5.12
Cash on hand Nov. 1, 1862	73.91
Danbury, Nov. 3d, 1862.	$10,415.73

JOHN W. BACON, Water Commissioner.

Sworn to before me, this 8th day of November, 1862.

W. JABINE, Notary Public.

The undersigned, appointed by the Borough, Auditors to examine the accounts of the Board of Water Commissioners, certify that they have examined the same from June 18, 1860, to Nov. 1, 1862, and find the same correct.

GEO. W. IVES, SAMUEL STEBBINS, } Auditors.

Danbury, Nov. 8, 1862.

LITIGATION ABOUT THE ANILINE COLORS.—M. Barrul gives us an account of the fierce and complicated litigation which has arisen in France, out of the colors derived from aniline. He observes:—"Rosaniline, of which the English exhibited such magnificent crystals at the International Exhibition, can only be manufactured or employed in dyeing and printing by one house; and yet rosaniline was neither discovered nor made by those who have obtained a patent monopoly. The litigation just terminated had reference to the *rouge d'aniline*, and arose out of suits for infringement of a patent, brought by Renard against several manufacturing firms. The alleged report of these proceedings fills upwards of twenty closely printed pages of small type. One of the pleas in defence was, that *rouge d'aniline* had been invented by the Anglo-German Professor Hofmann, who, however, had no such good fortune. Hofmann published what he had done, six months before Renard's patent was taken out. Hofmann was experimenting with the view of discovering an organic base, *carbotriphenyltiamine*—something completely different from *rouge d'aniline*. In the course of his experiments, he submitted one part of bichloride of carbon and three parts of aniline for thirty hours to a heat of 180° in sealed tubes; and Dr. Hofmann casually noticed that a substance of a splendid crimson remained in solution. He took no special notice of it; yet it seems that, if he had treated the same mixture with the same heat for only thirty minutes, he would have obtained a much larger quantity of *rouge d'aniline*. During the rest of the thirty hours he was only boiling it away. Was ever a philosopher so near making £100,000? Renard not only produced the color, and applied it to dyeing, but discovered several agents for producing this aniline red, and took out a series of patents for such discovery. He exhibited at the International Exhibition, and received two medals—one in the class of dye-stuffs, the other for chemical productions. Dr. Hofmann impliedly denied him the honor by giving the medal for his "development of the manufacture of *rouge d'aniline*." Very poor satisfaction for the Professor—this small power when exercised! In the course of the judgment, we find the following succinct statement of the pedigree of the tar-derived colors—coal distilled, produces tar; tar distilled, produces benzine; benzine treated with nitric acid, produces nitro-benzine; nitro-benzine treated by certain re-agents, and notably by oxygen, produces aniline; aniline treated by re-agents under divers patents, produces fuchsine, azaleine, anileine, &c.; fuchsine, azaleine, analeine, &c., treated by ammoniacal agents, produce the pure coloring principle, or rosaniline! Fuchsine, azaleine, and analeine, are the different salts of this one base—rosaniline. Finally, the court decided in favor of Renard, and gave him several thousand pounds of damages and costs.—*Journal of Gas-Lighting.*

IMPROVED PARIS GAS-BURNER.—The Paris Gas Company in their annual report, submitted to the general meeting of stockholders, held 12th March, 1862, says:

"In reference to the public lighting, we informed you last year that the substitution of burners with large slits in place of burners with narrow slits sensibly increased the illuminating power of the gas. An official document, emanating from the municipal administration, has, in the interval, appeared, which confirms our assertion. In a report of the 18th of November, 1861, to the municipal council, the Prefect of the Seine has pointed out the great improvement in the public ligthing which has ensued from the replacing of the old burner with narrow slits by a burner with large slits. In this document, the prefect admits that, by the simple substitution of a uniform burner with a large slit, consuming 4.9 cubic feet of gas per per hour, the intensity of the light has been tripled, and has sufficed, with an additional expenditure, of eight per cent., to obtain an increase in the light of 300 for 100."

GAS USED TO PRESERVE TIMBER.—M. de Lapparent, the director of the French dockyards, and inspector of timber for naval purposes, has proposed a plan for preserving wood by charring its surface by a burning jet of coal-gas. An exchange, speaking of the project, says:—"The apparatus which M. De Lapparent uses is simple, but could not be satisfactorily explained without a diagram. The consumption of gas would be about 32 cubic feet per 10 square feet of corbonized surface. A workman, on an average day's work of ten hours, would carbonize a surface of 440 square feet, and the expense would be 1½*d.* per 10 square feet. A little tar—not too much—smeared over the surface, facilitates the process; prevents the timber from being too suddenly affected by the heat of the gas, and facilitates the carbonization of cracks."

[The only novelty in this process seems to consist in using gas in lieu of other fuel to accomplish a purpose which is anything but new. Fence posts and telegraph poles have been charred when set in the ground for many years.—ED.]

GAS EXPLOSION IN ENGLAND.—The *Journal of Gas-Lighting* says:—Two private houses at Wigan were blown into ruins on Thursday by an explosion of gas. It was supposed that the gas had escaped from a pipe beneath the floor—not an unusual place of escape, but nothing was done to find out the place where the pipe leaked, though the smell of gas had warned the inmates some hours before the explosion. The neglect nearly cost the life of the tenant of one cottage, whilst the two cottages were very much injured.

JUSTICE TO GENERAL BENHAM.—Why is not a Court of Inquiry granted to Brigadier-General Benham? He has been deprived of his commission and rank of Brigadier-General without a word of explanation, or notice of a charge. While other officers of less merit are allowed the privileges of being heard, this brave old soldier, nearly thirty years in service, is denied it.

COAL IN COLORADO.—Judge Edmonds, Commissioner of the General Land Office, has received from the Surveyor-General of Colorado Territory several specimens of bituminous coal, some of which is of fine quality, and found in great abundance in that region.

HOW MIST IS GENERATED.—The production of mist is the subject of a note by Dr. John Davy, (brother of Sir Humphrey) in the *Edinburgh Philosophical Journal*. The cause usually assigned for mist is the access of cold air, and its admixture with warmer air, saturated or nearly saturated with moisture (such as that resting on the surface of large bodies of water), and strikingly exemplified in our autumnal and winter fogs, when the water, owing to the heat absorbed during summer, is of a higher temperature than the flowing air. Dr. Davy, however, refers to another cause, not so much noticed, viz., a mild moist air, coming in contact with a colder air, equally humid, resting on cold surfaces, whether of land or water, about the end of winter or beginning of spring. He describes mists which he considers to have been thus formed in the lake district of Cumberland. To a similar cause, also, he refers the phenomenon termed sweating, which is the precipitation of moisture on walls and flagged floors excluded from the influence of fire. He also attributes to a warm south wind, succeeding a very cold north wind, the deposition of a large quantity of moisture in the gallery of a nobleman in Devonshire, and quotes the saying in Homer, "The south wind wraps the mountain top in mist."

FIRE FROM BURSTING OF A GAS-PIPE.—A few days ago a fire occurred at No. 59 Liberty street, in this city, but was immediately discovered and extinguished. It was occasioned by the bursting of a gas-pipe in the office of D. Cohen, importer, on the second floor. A fire was burning in a stove in the office at the time. The damage was trifling. Had the accident occurred under similar circumstances during the absence of the occupants, the building could scarcely have been saved.

GAS EXPLOSION.—On Friday evening, November 21st, an explosion of gas took place in a sub-cellar of Taylor's Saloon, corner of Broadway and Franklin street, in this city. A leak in the gas-pipe was the cause of the explosion. Damage by fire was done to the extent of about fifty dollars.

PEORIA, ILL.—This gas company have not only assumed the war-tax, but have reduced the price of gas from $3.50 to $2.50 per thousand cubic feet. The company will not lose anything by their liberality.

REDUCTION IN THE PRICE OF GAS IN ENGLAND.—The Local Board of Health, of Beverly, England, to whom the gas-works belong, have resolved that on and after January 1st, 1863, the price of gas shall be reduced from 4s. 2d. to 3s. 9d. per thousand cubic feet.

GAS IN EGYPT.—The Viceroy of Egypt has placed Mr. George Bower, of England, in control of the arrangements for lighting his palace with gas. The works are to supply some 3,000 burners.

REPORTS OF GAS COMPANIES.—The engineers and superintendents of gas companies will confer a favor by sending us copies of their last report. Oftentimes these reports contain information of much interest to the profession, and all should be willing to assist in diffusing such knowledge.

GAS IN AUSTRALIA.—At Sydney the price of gas is 15s. per thousand cubic feet. At Melbourne there are two companies, which charge 16s. per thousand cubic feet, and £14 per public lamp. At Geelong the price is 20s. per thousand feet. At Ballarat it is 30s. per thousand. At Sandhurst it is 35s., and at Castlemain it is 40s. These last figures are about equal to California prices.

CARBURETTED GAS IN LONDON.—The former friends of the carburetted gas are fast losing their faith in it. It has been impartially tried in some parts of London, but so frequent has been the complaints that the authorities cannot any longer disregard them. Even the most strenuous supporters of the process have been compelled to admit the failure of the whole thing. Not only are the lamps said to be very dim where the process is in use, but the city engineer asserts that they actually consume more gas than those where the simple burners are employed.

PATENTS.

UNITED STATES.

36,688.—H. B. Morrison, of Mount Morris, N. Y., assignor to C. H. Morrison, of Le Roy, N. Y., for Improvement in Nozzles for Hose and Pipes:

I claim, first, the revolving or adjustable tips, J K, applied to A F, of hose or water pipes, as and for the purpose set forth.

Second, The arrangement of the nuts, B E, thimble, C, sleeve, D, when used in combination with the nozzles, A F, and sleeves, G, to operate as and for the purpose herein described.

36,689.—G. H. Smith (assignor to S. O. Smith), of Rochester, N. Y., for Improvement in Illumination:

First, I claim the use of common atmospheric air, in the place of oxygen gas in the combustion of illuminating gas or its equivalent, for the production of a high degree of heat, when such atmospheric air has been previously heated, and in that condition, is forced by properly arranged jets, into intimate contact with the illuminating gas at the moment of combustion, substantially in the manner herein above set forth.

Second, The use of common atmospheric air, in the place of oxygen gas in the combustion of illuminating gas or its equivalent, for the production of an intense degree of light, when such atmospheric air has been previously heated, and in that condition, is forced by properly arranged jets, into intimate contact with illuminating gas at or before the moment of combustion, both being at the same time made to impinge upon a suitable piece of lime or other known equivalent, substantially in the manner as above described.

Third, The use of common atmospheric air, in the combustion of illuminating substances, such as illuminating gas, oils or hydrocarbons or their equivalents, for the production of an increased degree of light, when such atmospheric air has been previously heated, and in that condition, is brought in intimate contact with any of said illuminating substances, at or before the moment of combustion.

36,694.—B. R. Alden, of New York City, for Improvement in Lamp Burners:

I claim, first, A lamp burner provided with a cone or deflector constructed of porcelain, pottery, earthenware, or any baked earth or earthly cement, substantially as set forth.

Second, The combination of said cone with the case or jacket, C, arranged substantially as and for the purpose specified.

36,698.—J. S. Barden, of New Haven, Conn., for Improvement in Water Meters:

I claim the above described arrangement of the eduction passage, valve chest, water chamber, cylinders, pistons, valves, and valve operating mechanism, as applied in manner, and so as to operate together substantially as set forth.

I also claim the tenoned stuffing boxes and the slides, applied in the case and its partition and shaft, K, substantially in manner and for the purpose as specified.

36,702.—H. H. Cooley, of Battle Creek, Mich., for Improvement in Pistons for Force Pumps:

I claim the piston, A, divided into three compartments, b b' c, the latter, c, communicating with b b', by means of the openings, d d', and provided with the ball valve, C, in combination with the tubular piston rod, B, all arranged to operate in connection with a pump cylinder provided with a side water passage and suitable valves, as set forth.

36,703.—A. C. Dewies, of Crefeld, Prussia, for Improvement in Lubricators:

I claim the combination of the transparent vessel, A, the stopper, C, and the tube, B, having its flow regulated by the perforations in the end within the vessel, A, and the other end adjusted to the curvature of the shaft with the journal-box, D, and shaft, E, when the whole are constructed, arranged and operate as described for the purpose set forth.

36,708.—James Greaves, of Utica, N. Y., for Improvement in Pumps:

First, I claim the combination and arrangement of the flange, 3, and base, 2 2, as constructed and combined with the upper part, 1, and spout, 3, metal band, 5, as fastened to the wood pipe, 4, the elbow, 9, and flange, 10, as combined with the rod, 7, and pipe, 4, said pipe being the only support of the barrel, 8, and the barrel, 8, when constructed of stoneware or earthenware, all as shown in Fig. 1, as and for the purpose described.

Second, The rubber pipe, 12, as combined with the iron pipe, 11, and earthenware pipe 15, the enlargement, 13, ring, 14, and rod supporter, 16, all shown in Fig. 1, all as and for the purpose described.

36,717.—A. C. Ketchum, of New York City, for Improvement in Lamp Burners:

I claim, first, A lamp burner having a metal wick tube, B, surrounded by a case or jacket, C, of porcelain, pottery, earthenware, glass or any baked or unbaked clay or earthy substance, which is a good non-conductor of heat, substantially as and for the purpose herein set forth.

Second, A cone or deflector, D, constructed of metal and enameled both externally and internally, and applied to the case or jacket, C, or to the lamp, substantially as and for the purpose herein shown and described.

36,741.—S. W. Warren, of Brooklyn, N. Y., for Improved Low-water Detector:

I claim the combination of the casting b, with, the steam and water pipes, c and d, the mercury reservoir, a, and an elastic diaphragm when arranged so as to operate together to work a valve, substantially as and for the purpose set forth.

36,752.—William Combe, of New York City, assignor to N. O. Hawkshurst, of Queens County, N. Y., for Improvement in Wooden Sieves for Gas Purifiers:

I claim the employment of a wooden grating having the opening made expanding downward to support the lime in dry lime purifiers in gas-works, constructed substantially as and for the purpose set forth.

36,755.—G. L. Witsil (assignor to himself and W. L. Wattis), of Philadelphia, Pa., for Improvement in Coal-oil Lamps:

I claim the two distinct tapering air flues, A A, in combination with the two deflectors, a' a', and the spacious wick chamber, B; the same being constructed and arranged in relation to each other and the cap, C, substantially in the manner described and set forth, for the purpose specified.

36,769.—David Dick, of Meadville, Pa., for Improvement in Apparatus for Mineral Oils as Fuel:

I claim, first, The employment in a mineral oil furnace of pumice stone or other equivalent porous incombustible material, through which the oil flows, and upon the surface of which it is burned, substantially in the manner described, for the purposes set forth.

Second, The combination of a furnace in which mineral oils are employed as fuel, with a water space surrounding the same, substantially in the manner described, for the purpose of preventing the overheating of the furnace, and the consequent generation of gas in the fire-box, as set forth.

Third, The combination in a mineral oil furnace of a water chamber, a fire-box, and a series of air-flues, substantially in the manner and for the purposes described.

Fourth, The combination of an extinguisher plate with a fire-box and air tubes, substantially as and for the purpose specified.

Fifth, Perforating the extinguisher plate, as described, for the purpose of permitting the escape of the gas, and preventing the entrance of air, as set forth.

36,792.—G. A. Poppy and C. H. Colegrove, of Rochester, Ohio, for Improvement in Water Elevators:

I claim the compound clutch and brake, G, in combination with the spring lever, L, weighted pawl, F', and pully, C, when these parts are constructed, arranged and operated as and for the purpose herein set forth.

36,798.—Gregory Roth, of Cincinnati, Ohio, for Improvement in Candle Molding Machines:

I claim the arrangement of the stationary perforated racks, B B' B'', and the perforated slide, C, adapted to retain and center the candle while permitting the descent of a full sized tip mold, substantially as set forth.

36,802.—James and A. W. Sangster, of Buffalo, N. Y., for Improvement in Lamp Chimney Fastenings:

We claim the stationary lip, I, the movable lip on the lever, F, the spring, E, the thumb piece, K, and the aperture, V, arranged in the manner and for the purpose herein set forth and described.

36,805.—J. D. Smedley, of Chicago, Ill., for Improved Grate for Burning Petroleum and other Liquid Fuel:

I claim, first, The arrangement and combination of the trough or grate, A, and the air-conducing pipes, B B, substantially as described and for the purpose above set forth.

Second, The arrangement and combination of the trough or grate, A, the air-conducting pipes, B B, &c., and the supply pipe, D, with its gage cock, I, appended, substantially as described and for the purpose above set forth.

Third, The arrangement and combination of the trough or grate, A, the air-conducting pipes, B B &c., the supply pipe, D, with its gage cock, I, appended, and the damper, E, substantially as described and for the purpose above set forth.

Fourth, The arrangement and combination of the trough or grate, A, the air-conducting pipes, B B, &c., the supply pipe, D, with its gage cock, I, appended, the damper, E, and the lower air chamber, L, substantially as described and for the purpose above set forth.

Fifth, I claim so constructing the trough or grate, A, narrowing from its upper surface and edges at an angle or curve to the bottom, as to prevent continually reducing areas or surface, substantially as described and for the purpose above set forth.

36,825.—William Mullally, of St. Paul, Minn., for Improvement in Pumps:

I claim the combination of the hollow operating and discharging rod, K, hollow diaphragm, E F G I, internal valve, J, chambers, a b, and ports, N O f g, the whole being arranged to operate in manner substantially as and for the purposes set forth.

36,826.—Giuseppe Tagliabue, of New York City, for Improved Apparatus for Testing Coal Oil:

I claim, first, The vessel, B, extending above the stand, A, and having holes in it near the top.

Second, The cup, P, with its projections on the outside.

Third, The ring, Q, in the cup, P, that holds the cover, C, and its appendages upright in any position other than over the vessel, B.

Fourth, The perforated tube, D, that surrounds the thermometer, and enters the ring, Q, allowing the cover, C, to stand in any position.

Fifth, The dome, F, with the opening, L, in front, for applying the lighted paper or wood, and the opening, K, on top.

Sixth, The rotating covers, J J, on the cover, C; each and all as and for the purposes substantially as described.

36,837.—H. C. Hunt and G. W. Devin, of Ottumwa, Iowa, for Improvement in Pumps:

The stationary semi-cylindrical case, B, provided with the slide valve, D, abutment or partition, a, and induction openings, c c, with the eduction pipe, C, placed between them, in combination with the oscillating plate, F, having the pistons, E E', attached and placed respectively in the compartments, b b', and provided with the arms, g g, which are connected to a suitable lever, G, all arranged to operate as and for the purpose herein set forth.

IRON FOUNDRIES.

BERGEN IRON WORKS,
Established 1833.
R. A. BRICK, Manufacturer of CAST IRON WATER and GAS-PIPES. RETORTS, PIPES, &c., always on hand. Office, 109 Leonard Street, New York.

S. FULTON & CO., (Successors to Colwell & Co.) Manufacturers of Pig Iron and Cast Iron Gas and Water Pipes, also Heavy and Light Castings of every description, No. 207 North Water street and 206 North Wharves, Philadelphia.
SAMUEL FULTON, THEO. TREWENDT.

FLORENCE IRON WORKS.—The subscriber is prepared to execute orders and make contracts for Cast-Iron Water and Gas-Pipes, from 2 inches to 48 inches in diameter; also, Retorts, Bench-Castings, Branches, Bends, and all Castings for Water or Gas-Works. Pipes and Castings coated with Smith's Patent Coal Tar Varnish to prevent corrosion.
JOSEPH G. JONES,
205½ Walnut Street, Philadelphia.

THE ALPHA TUBE WORKS,
WALSALL, STAFFORDSHIRE.—Established 1830.
LAMBERT BROTHERS,
Manufacturers of
LAP-WELDED BOILER TUBES, LOCOMOTIVE AND MARINE ENGINE FITTINGS,
WROUGHT IRON WELDED PIPE,
FOR STEAM OR HIGH-PRESSURE WATER AND GAS;
HIGH-PRESSURE STEAM AND WATER VALVES,
FIRE & GARDEN ENGINE WORK, PUMPS, HYDRANTS, WATER-CLOSETS,
IRON AND BRASS GAS-FITTINGS, GASELIERS, &c.,
AND OF THE GROVE BEDSTEAD WORKS, WALSALL.
Delivery Free, in Liverpool, &c.
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WARREN FOUNDRY AND MACHINE CO., Phillipsburg, N. J. Manufacturers of Cast-Iron Pipes, from 2 to 48 inch diameter, all pipes from 3 inch to 48 inch cast vertically, and in dry sand, in lengths of 12 feet. 2 inch pipes in lengths of 7 feet. Special Castings of all descriptions furnished at short notice.
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PHILADELPHIA, manufacture Wrought Iron Welded Tubes for Gas, Steam or Water; Lap-Welded Boiler Flues,
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of Wrought or Cast-Iron, screwed together, flush inside and out; Gas-works Castings, Retorts and Bench Castings for Coal Gas-works.; Cast-Iron Street Mains, Bends, Branches, Drips, &c.
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WATER-GAS.—W. H. GWYNNE'S PATENT.—W. H. Gwynne & Co. are prepared to make arrangements with Gas-Companies for the adoption of their method of making water-gas, which offers important advantages over any other process; also, to erect new Works of any size. The common coal benches are altered with slight delay and expense, and without deranging the setting. By the use of our apparatus, the following results are obtained:

A gain of *more than fifty per cent.* in the quantity of gas produced from any description of coal.

Facility in making any *quality*, from the most highly carbonized, to the poorest that is susceptible of being distributed.

Ability to use any kind of Coal, from the richest cannel to the poorest semi-bituminous, Petroleum, Tar, or any Hydrocarbon.

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PATENT BITUMINIZED PIPES,

For the Conveyance of Water, Gas, and Drainage.

This important invention, patented by Mr. Charles Newbold, and now for the first time introduced to the public, may confidently be stated to be one of the greatest interest and commercial value, as the Patent Bituminized Pipes possess all the qualities necessary for the conveyance of Water, Gas, Sewage, Mine-Pumps, &c., viz.: great strength, great durability, and inoxidability, with the immense advantage of being about *one fifth* the weight of iron pipes, and about 35 per cent. cheaper; whilst, compared with lead pipes, the Bituminized Pipes are only about *one fourth* their price, without the possibility of the formation of the oxide and carbonate of lead, so dangerous for every purpose. They will stand 150 degrees of Heat, and after many trials it has been satisfactorily proved that rats or vermin will not touch them. They also withstand the action of all acids and salts.

Iron pipes are at present frequently covered with a coating of bitumen or coal tar before they are laid down; but the adherence of this coating to the metal being very imperfect, on account of vibration and the difference of expansion, this preservation is insufficient, besides being exposed to a number of influences which neutralize its efficacy—galvanic currents materially assist the formation of oxides and deposits, which cause the obstruction and eventually the destruction of metallic pipes.

The Patent Bituminized Pipes are neutral, non-conductors of electricity, and consequently are not exposed to any of the deteriorating influences mentioned above. The process of manufacture of these Pipes consist in causing a roll of paper to pass through a reservoir of melted bitumen, after which it is tightly coiled around a mandril to any required thickness; and thus, when hardened, a tube is formed of perfect texture, great hardness, and enormous strength. These Pipes are proved, by hydraulic pressure, to resist a pressure of 220 lbs. to the square inch, equal to 506 feet head of water, which is more than double the altitude of the highest reservoir. The bituminous composition which unites and covers these Pipes is so well known as an excellent preservative, that it will be unnecessary to demonstrate that, when laid underground, the durability of the Patent Bituminized Pipes may be considered as unlimited. The Pipes are made in lengths of seven feet, and are connected by socket joints of the same material as the Pipes; or they can be fitted with iron flanged sockets, screwed together in a most simple and inexpensive manner.

For Gas these Pipes are invaluable; the Gas-lining which we insert effectualy resists the action of Gas, and being non-conductors, there can be no condensation in them, and the joints made with the Patent Cement are so strong as to entirely prevent Leakage.

The cost of laying the Pipe is also small, compared with those of iron, and can be done by mere laborers. The Bituminized Pipes have been in use the last three years, for the conveyance of gas and have been ascertained to be as perfect now as when first laid down.

DIRECTIONS FOR JOINING THE PATENT BITUMINIZED PIPES.

Pack the pipes level in the ordinary way; slip the collar over one of the pipes; draw the ends close together and warm them by putting a hot iron between them; then press them together so as to make them adhere; take a piece of iron wire netting, about half an inch in the mesh, a little narrower than the length of the collar, and long enough to wrap once round the pipe, spread the collar over it and the joining; close the ends with clay; pour the melted cement into the manhole of the collar, and fill up the interior space; then remove the clay and the joint is finished.

It is necessary to leave a small vent hole in the clay at each end of the collar to allow the air to escape as the cement is poured in, that there may be no flaws or air bubles in it when cold. If in cooling the cement settles in the manhole, fill up again.

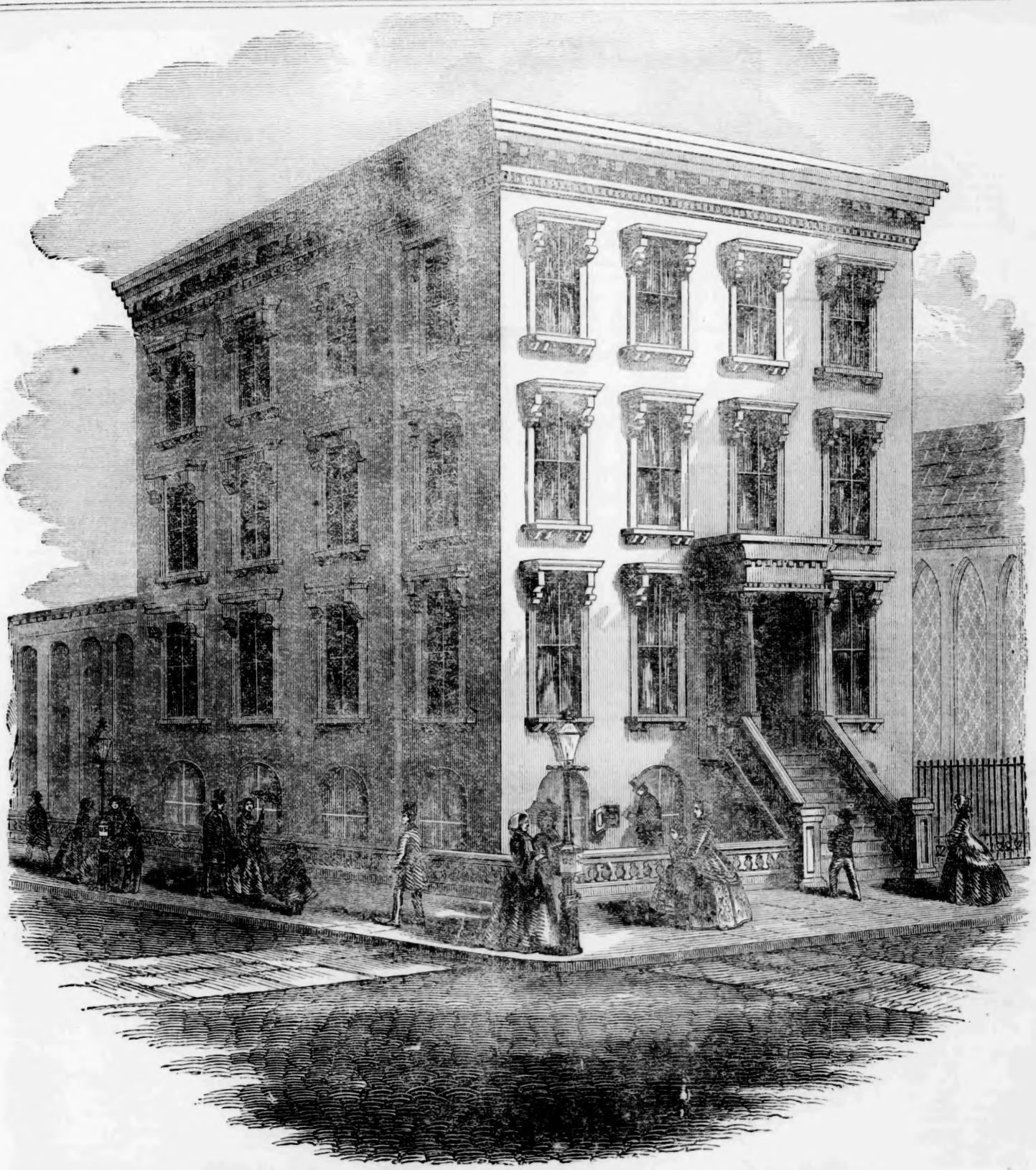
N. B.—The cement should be broken into small pieces and melted in a pot as you do lead, at a low temperature, until it is dissolved; it must be stirred while melting; then take it off and keep stiring it as it cools until it becomes nearly as liquid as water; then pour quickly.

All Orders should be addressed to

THE AMERICAN BITUMINIZED PIPE COMPANY,
OFFICE 24 WATER STREET, BOSTON, MASS.,
J. McGEARY, AGENT;

or to FREDERICK W. BOND,
SOLE AGENT FOR NEW YORK,
58 LIBERTY STREET, (Between Broadway and Nassau Streets,) **NEW YORK.**

Cement for Joining, For Sale as above.



THE TWO GREAT PATENTS OF THE DAY.

1.—Improved Mode of Setting Gas-Meters in the Walls of Buildings.

2.—Cast-Iron Mail-Stations for Public Lamp-Posts.

Adopted by the UNITED STATES GOVERNMENT for the Principal Cities.

ALBERT POTTS, Philadelphia, Patentee.

By the FIRST IMPROVEMENT the Meters may be inspected at any time from without, by the agents of the Gas-Company having keys for that purpose. Thus burglars need no longer gain admittance to dwellings under pretense of examining the meters, while they, in fact, examine the fastenings. The meter-box, being neatly and securely imbedded in the front wall, the meter is protected against frost by means of a thick pad on the back of the door. It has been satisfactorily tested in long continued severe weather and found to be eminently successful.

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Both of these improvements are to be seen at the Rooms of the AMERICAN GAS-LIGHT JOURNAL, New-York City. For further information address the Proprietor of this JOURNAL who is authorised to contract for the use of both Improvements, or

ALBERT POTTS, Philadelphia.

WOOD GAS.

THE INVENTOR AND PATENTEE of a New and Improved Retort for Manufacturing Gas from Wood, Turf, &c., would call the attention of Gas Companies, and the public generally, to an invention which will be a great saving to the community, as they can thereby supply an exceedingly cheap, clear, and brilliant light, besides useful products in profusion. The Works can be seen in successful operation at the Cremorne Gardens, Fourteenth street and Sixth avenue, on application at the office of the Patentee, No. 23 Liberty street, New York, and where any information may be obtained, and where Companies or private individuals wishing to purchase rights for Hotels, Factories, Private Houses, Cities, Counties, or States, will please apply.

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CONICALLY SLOTTED SOLID Wood Trays for Gas-Purifiers.—Admitted to be the best, cheapest, and most durable seives for gas-purifiers ever used.

Secured by Letters Patent of the United States, both for the machinery used in the manufacture, and for the seive itself.

For sale on reasonable terms to Gas-Light Companies or Agents, on application, by letter, to the patentee, RICHARD G. HUNT,
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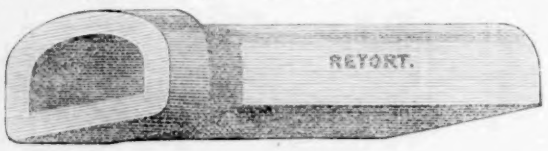
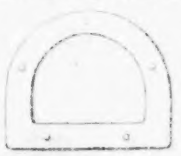
N. B.—All persons are warned against purchasing these seives of others who falsely pretend to have patents for them. Suits will be commenced immediately against all persons infringing my patents by using or making wooden sieves, but those who hereafter purchase from me can buy their seives cheap and will not be troubled by me on account of former purchases. R. G. H.

COWEN'S PATENT FIRE-CLAY RETORTS.





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Have always been, and are still, the most extensive manufacturers of FIRE-CLAY RETORTS in the United Kingdom, and were the only parties to whom a Prize Medal was awarded at the Great Exhibition, in London, 1851, for

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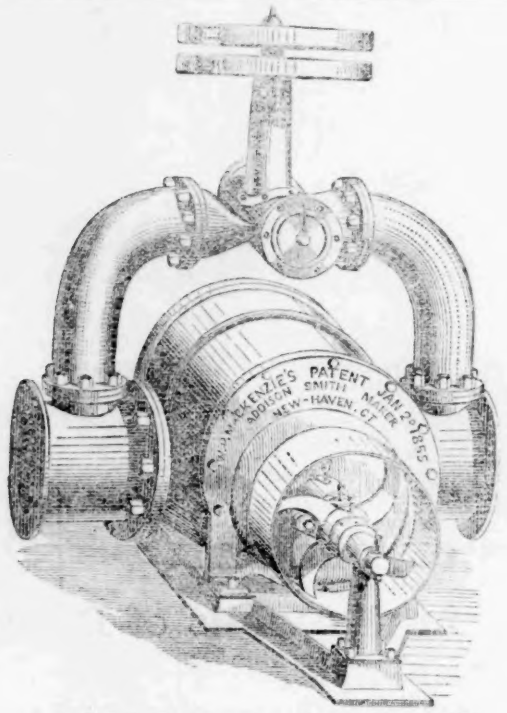

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They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

We are also sole proprietors and manufacturers of the

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The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary Fan. The Cupolas are manufactured in sizes to melt from 1 ton to 20 tons per hour, will save one quarter of the time required by the old style Cupola, and 33 per cent. uel. Address SMITH & SAYRE, 458 Broadway, New York.

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It consists of seventy-two parts Oxide of Iron, and twenty-eight parts Cement Lime Stone in the one hundred pounds.

It has much more body than red or white lead. It is warranted perfectly water and fire-proof and to withstand a greater heat on metals without scaling, than any other paint in use.

It is a perfect cover for all kinds of iron, tin, or wood-work, out-houses, and canvas coverings. It prevents and arrests the corrosion of metals, and is not affected by the action of salt, gases, acids or ammonia.

It hardens under water, as has been fully demonstrated by its application to gas-holders, by many of the largest gas companies in the United States; which companies having thoroughly tested its properties as herein claimed, pronounce in its favor over any other paints in the market, even though sold at double its price.

As a coating for patterns of iron or wood, when mixed with shellac, it is much superior to beeswax, oil, or shellac alone, as has been proven at the large founderies in the country.

For patching boilers and making joints, it is considered superior to red lead, or any other preparation.

For cleaning metals it takes the place of crocus, rouge, and emery, being better and cheaper.

This Paint requires no more oil than dry lead or zinc, and much less than the ordinary mineral paints. It is free from any waste, and possesses a spreading and covering power unequaled.

Terms, by the Barrel or Half Barrel, Four Cents per Pound.

A liberal discount made to parties purchasing by the ton.

A Barrel or Ton will be forwarded to any gas companies desirous of testing its qualities, for which there will be no charge if it does not give entire satisfaction as being the cheapest and most durable of all other Paints in the market.

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JOHN JEFFREY, GAS ENGINEER, Cincinnati, Ohio, is prepared to furnish Plans, Specifications, Estimates, and Proposals for Gas-Works of all sizes, suitable for lighting Cities, Villages, or Private Dwellings, Hotels, &c.. &c. Also, to act as Consulting and Visiting Engineer for Gas-Works already established, in any part of the country.

He refers to most of the principal Gas-Works in the West, and upwards of twenty years extensive experience in Gas-Works.

A CIVIL ENGINEER, HAVING A number of years experience in the manufacturing of COAL-GAS, is desirous of obtaining charge of some department in a first-class Gas-Works, or charge of the same in the country. Salary not the principal object. Best of reference. All communications will receive a prompt attention. Address

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TO GAS COMPANIES.—A COMPETENT Engineer can be engaged on favorable terms, to alter Rosin, or make repairs or extensions to Coal Works. Satisfactory reference for capability. Address

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The second part is approaching completion and will shortly be announced.

"NEW BOOKS." ANY OF OUR Readers who may require books on the subject of Gas-Light, Heat, Water, Sewerage, or other scientific matters, can be promptly supplied by addressing the Publisher of The AMERICAN GAS-LIGHT JOURNAL, No. 58 Liberty st., New York.

POTTS' REVOLVING SIGNAL LIGHTS,

PATENTED SEPTEMBER 8, 1857.

Mr. ALBERT POTTS, the well known Inventor of the LAMP-POST LETTER-BOXES, which have been adopted by the Post-Office Department for the large cities of the United States—and also of the GAS METER BOX, to be set in the front walls of houses, thus doing away with visits from Gas Inspectors, or burglars in gas-clothing, has lately brought forward a third Invention, which, in point of importance and world-wide usefulness, surpasses the others entirely.

These SIGNAL LIGHTS are intended for use on Vessels propelled by Steam, and those exclusively. They specially indicate the presence of a Steamer, and by their use there will be less likelihood of mistakes, and consequent collision, than at present. They are also intended for SIGNALLING AT NIGHT, and can be used for that purpose UNDER ANY CODE of SIGNALS NOW ARRANGED FOR FLAGS.

This Improvement in Lights for Steam Vessels consists in having the Lanterns containing the colored lights connected by means of a series of cogged gearing with some convenient part of the Engine or Machinery, so as to cause them to have a revolving motion around their axis. On side-wheel steamers, the Lanterns should be placed directly over the wheel-houses, and the power, or motion to turn them, may then be very conveniently obtained from the paddle-wheel shaft. On Propellers, the Lanterns should be placed on each side of the Pilot House, or hurricane deck, and the rotary motion derived from any convenient or suitable part of the Engine or Propeller shaft. Each Lantern is supported on the end of movable cranes, so that their relative positions may be changed and properly adjusted to suit the view of observers on either side of the vessel at the time of signalling.

The Lanterns to be used in this improvement may be constructed for Burning Oils, Fluids, Gas, or any of the known modes of illumination, and should be furnished with one or more lenses and reflectors, so as to concentrate the rays of light, and project them over the horizon with the greatest intensity. The lenses for this purpose should be made with colored glass, viz., Red and Green, and the position of the respective Lanterns, according to the color of the lenses therein, must be placed on the sides of the vessel so as to answer to the requirements of Rules and Regulations made and published by the Supervising Inspectors of Steamboats, agreeably to the Act of Congress of the United States in such cases made and provided. That is to say—by said Regulation—the Lantern having the green lenses for producing the Green Colored Light, must be placed on the starboard side of the vessel, and the other Lantern producing the Red Light, to be placed on the port side thereof. In pursuance, also, of the aforesaid Rules and Regulations, there is to be found in board and behind each Lantern, a screen to answer the purposes therein mentioned.

The cogged gearing, by which the Lanterns are connected with the Engine or paddle-wheel shaft, and thereby caused to revolve when the Engine is in motion, is so arranged that the connection may be readily shipped or unshipped, and the Lanterns made stationary or otherwise, at the pleasure of the Pilot, or those whose duty it may be to operate and attend to the same. The cranes on which the Lanterns are placed are also rigged so as to be readily turned horizontally from one position to another, so as to present one or both lights to the view of observers when laying athwart ships at the time of signalling.

On the Use and Application of the Improvement for Night Signals.

When the vessel is under weigh or going ahead in its course, the Lanterns are to be placed directly athwart ships, so that such colored light therein will then have the position and place prescribed by Rule Seventh of the afore-said Supervising Inspectors of Steam Boats, and with the screens behind them, as above described, will then answer all the intents and purposes for which the colored lights are thus required to be used, as illustrated in the several diagrams published by said Inspectors for the working of a system of Colored Lights. The Lights in this case, according to the color seen by the observer, indicate the course or direction of the vessel whereon they are carried. When the Lanterns with the colored lights therein, are made to revolve around on their axis, as proposed in this improvement, in addition to the signal above, another and as we believe, very important and useful signal is thus formed, indicating that the vessel, whereon it is carried is a Steamer. In dark foggy nights, it is found by experience, to be somewhat of a difficult task to distinguish sailing vessels from Steamers and Propellers, especially when the latter are rigged, and carry a press of sail. When Steamers meet "head and head," it is the duty of each to pass to the right, or, on the larboard side of the other. Whereas, when a Steamer meets a sailing vessel, the former must give way and allow the latter to pursue its course. Hence, to carry out the regulations of the said Steamboat Inspectors, and prevent collisions, it is important to have some infallible sign, whereby the character of the vessel may be readily seen and determined. Several very fatal collisions have recently taken place through mistakes of this kind.

On Signals for Speed and Distance.

The gearing of the Lanterns with the paddle wheel or propeller shaft, may be so arranged as to be an index of their speed. A very good proportion, would probably be to make the Laterns turn about one third as fast as said shaft. Hence, when the speed of the vessel is previously known, when making a certain number of revolutions of the paddle or propeller, it becomes an easy task from observing the time with which the Lanterns thereon may be turning to approximate to the speed with which the said vessel is moving at the time of observation. Again, as the arcs described by the rays of light from each lantern, as they revolve around on their axis, is greater in proportion to the distance from said lantern, so will the time in which said rays move over any given space, be less in the same proportion. Hence, when the lights are very remote, or far off, from the observer, the duration of each column or cylinder, of rays from each lense, would pass the eye of the observer, in a short space of time, or with great velocity. Whereas, at a nearer point of observation, the time of its passage would be considerably lengthened, or the motion thereof apparently much slower. From these facts, we believe the improvement is susceptible of indicating, in an approximate manner, the speed and distance of vessels whereon the revolving lights may be used.

On the Application of the Improvement for Marine Telegraphic Purposes.

The Revolving Lights can be readily applied to the general purposes of Marine Signalling at night, as follows: In order to show this application, we have adopted the Numbers as given in Roger's Code of Marine Day Signals, believing that work to be somewhat of a standard in matters of this kind. Instead of the flags used in the above code, for day signals, to indicate the combinations of two or more letters of the Alphabet, which combination is referable to certain numbers indicative of the words or sentences telegraphed, we propose to perform the same operation, at night, by means of the two revolving colored lights, so as to indicate the numbers directly to which the intended words or sentences to be telegraphed are referable. Thus, whether the vessel to be signalled is ahead, astern, or abaft the beam, the position of the two colored lights must be so adjusted, by means of the moveable cranes, whereon said lanterns or lights are fixed, that the two lights may be fully made visible to the observer. When both lights are thrown into this position, stopping the motion of the lanterns may be the signal for calling attention, or a rocket fired off, or the steam whistle blown, would answer the same purpose. Now, in order to represent the ten numerals, we propose to indicate them by the respective motions of the two colored lights, as follows:

RED LIGHT.				GREEN LIGHT.			
One Red,	Represents	Number	1.	Two Green,	Represents	Number	2.
Three	do.	do.	3.	Four	do.	do.	4.
Five	do.	do.	5.	Six	do.	do.	6.
Seven	do.	do.	7.	Eight	do.	do.	8.
Nine	do.	do.	9.	One	do.	do.	0.

In the above arrangement, it will be seen that all the odd numbers are made by the Red Light, and the even numbers by the Green Light. In order to indicate the repeat of the last number, once or more times, or for other special purposes, which may hereafter be found useful and necessary, an even number of lights may be shown by the Red, and an odd number by the Green. It will be understood that when the Lanterns are made with three lenses in them, the numerals as above arranged are formed by the number of times a new light or lense is presented to the observer. Thus to indicate the number 3, the Red Light or Lantern would make one entire revolution; and to make the number 6, the Lantern carrying the Green Light would make two revolutions, and so on with the other numbers. When a symbol is made, the motion of the Lantern is to be suspended for a short time, and when a number expressing a sentence is formed, the lantern may be stopped for a longer period, or some one of the special signals above referred to, may be used for this purpose.

To show the application of this improvement as above mentioned, whereby these Lights can be used as readily for Night Signals, as Flags are used for Day Signals by the author of Roger's Code, we shall use the sign O colored red or green, according to the light used, to show the number of movements performed by the respective lights in order to represent any desired number of said code, suitable for the required purpose.

RED LIGHT.	GREEN LIGHT.
O, O, O, O, O,	
O. O. O, O, O, O, O.	
	O, O.
	O, O.

The above would represent the number 5722, and by reference to said Roger's Code, would be found to stand before the sentence:

"WILL YOU SHOW THE NUMBER THAT REPRESENTS YOUR NAME?"

RED LIGHT.	GREEN LIGHT.
O.	
O, O, O, O, O.	
O, O, O, O, O, O, O.	
	O, O.

Here the number expressed is 1572, and per the same Code, stands for

"WHERE ARE YOU BOUND?"

RED LIGHT.	GREEN LIGHT.
O.	
O, O, O, O, O, C, O, O, O.	
	O, O.
	O, O, O. O, O, O, O, O, O.

The number thus expressed is 1928, and per said Code is

"WHAT IS YOUR CARGO?"

RED LIGHT.	GREEN LIGHT.
O, O, O, O, O.	
	O, O, O, O, O, O.
	O.
O, O, O.	

Here the number expressed is 5603, and stands for

"HAVE YOU ANY NEWS?"

(RED LIGHT.)

Fig. 2

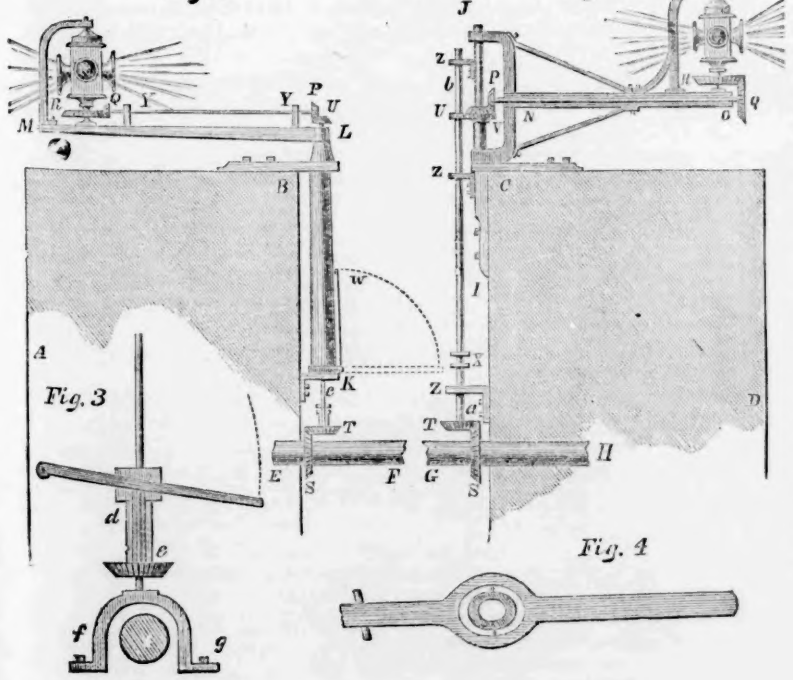

Fig. 3

(GREEN LIGHT)

Fig. 1

Fig. 4

MECHANICAL CONSTRUCTION.

In our engravings, Figs 1 and 2, represent Vertical Sections through the wheel-house. In them E F and G H represent portions of the main Shaft. In Fig. 1, I J is a stout Iron or Wooden post, fastened against the side of the wheel-house, directly over the main shaft. On the upper part of this post, is fitted the moveable arm or crane N O, to the main shaft is fitted the bevel wheel S, and to the lower end of the rod a b, is fitted a corresponding wheel T. U is a small pinion on a b, which gears with the spur wheel, V, which in turns gives motion to the wheels, P and Q, and so revolves the lamp R. It will be seen that a Rotary motion is given to the lamp, when the main shaft is in motion and a b connected.

It can be disconnected by a lever, acting between the bosses X, which will elevate the rod in the guides Z Z Z.

Fig. 2 is another arrangement, for the same purpose. In this, K L represent a hollow Shaft, on which is firmly fastened, the arm L M, on which is the lantern. The hollow post is secured to the wheel-house by the straps K and B, and it can turn freely in them, the other part being the same in them as in fig. 1

The lever K W, when drawn down, will turn the frame in any required position around the Shaft c U. In fig. 1, the arm or crane N O, may be operated by cords from the wheel house, but in this device, the rod c U, does not lift up as in fig. 1, but in its place, the lower end is made square, and on it slides the short tube, d E, shown in fig. 3. The lower end of the rod turns on a bridge, f g, spanning the main shaft. On the upper end of the tube, d e, a lever is attached by means of boxes and collars as shown in fig. 4. This lever when raised carries with it the beveled wheel T, thus disconnecting the gearing apparatus.

ALBERT POTTS, Patentee,
PHILADELPHIA, Pa.

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